Title

Flood Assessment at the Area 5 Radioactive Waste Management Site & The Proposed Hazardous Waste Storage unit, DOE/NTS, Nye County, NV Study of 100-Year Flood . Hazard

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Flood Assessment at the Area 5 Radioactive

REVIEW DRAFT

FLOOD ASSESSMENT AT THE
AREA 5 RADIOACTIVE WASTE MANAGEMENT SITE
AND THE PROPOSED HAZARDOUS WASTE STORE
DOE/NEVADA TEGE

APPROVALS

FLOOD ASSESSMENT AT THE AREA 5 RADIOACTIVE WASTE MANAGEMENT SITE AND THE PROPOSED HAZARDOUS WASTE STORAGE UNIT DOE/NEVADA TEST SITE, NYE COUNTY, NEVADA

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January 1993

FLOOD ASSESSMENT

EXECUTIVE SUMMARY

A flood assessment at the Radioactive Waste Management Site (RWMS) and the proposed Hazardous Waste Storage Unit (HWSU) in Area 5 of the Nevada Test Site (NTS) was performed to determine the 100-year flood hazard at these facilities. No previous flood studies of these facilities delineated the 100-year flood hazard. This current study was conducted to determine whether the RWMS and the proposed HWSU are located within a 100-year flood hazard as defined by the Federal Emergency Management Agency (FEMA), and to provide discharges for the design of flood protection.

The overall watershed which could impact the RWMS and the proposed HWSU is approximately 140-square miles. This watershed was divided into 16 subbasins to best represent the hydrology of the study area. United States Geologic Survey (USGS) topographic maps were used to divide the drainage area into subbasins ranging in size from 0.3-square miles to 81.3-square miles. Barren Wash, Scarp Canyon, and Halfpint alluvial fans were delineated. These fans are characterized by incised channels in the upper parts of the fans decreasing to sheetflow in lower parts of the fan.

The 2-year, 10-year, and 100-year discharges were determined using methods and guidelines provided in the Clark County Regional Flood Control District (CCRFCD) *Hydrologic Criteria and Drainage Manual, 1990.* The methodology in the CCRFCD Manual was developed specifically for Southern Nevada by Clark County and the U.S. Army Corps of Engineers, Los Angeles District, and is the most current and region-specific approach to develop discharges. Flood studies conducted in Clark County following the methods provided in the CCRFCD Manual have been accepted by FEMA. The proximity of Area 5 to Clark County and their similar physical and climatic characteristics support the use of this region-specific method as the means of generating discharges for the study area.

As directed in CCRFCD Manual, the HEC-1 rainfall-runoff model developed by the U.S. Army Corps of Engineers was used to generate discharges for the RWMS and the proposed HWSU areas. Hydrologic models were developed for the 2-year, 10-year, and 100-year discharges. Point precipitation values used in this model were taken from NOAA Atlas 2, Volume VII. Field observations were made to determine the vegetation type and cover density, Manning roughness coefficient, slope, channel geometry, and concentration point locations. From this information, curve numbers (a method to quantify precipitation losses) and lag times

potential flow obstructions and diversions, fan surface slopes, Manning roughness coefficients, single-channel versus multiple-channel regions, and the 2-year, 10-year, and 100-year discharges from the hydrologic analysis. This information was gathered from studies of available topographic and surficial geologic maps and intensive field investigations. The results of the alluvial fan analyses are shown on the maps included in this document.

Part of the RWMS is located within the 100-year flood hazard on the Barren Wash Alluvial Fan. The southwest corner of the RWMS is within the Zone AO of the Barren Wash Alluvial Fan. (This part of the RWMS does not include RCRA units covered in the RCRA Part B Permit Application.) FEMA designates alluvial fan flooding, shallow concentrated flow, and sheetflow areas with 100-year flood depths between 1 and 3 feet as Zone AO. FEMA further designates an associated flow velocity for alluvial fan flood hazards.

The HEC-2 model developed by the U.S. Army Corps of Engineers to determine water surface elevations in channels was used to assess the flood hazard of shallow concentrated flow in a channel impacting the southwest corner of the RWMS. This analysis determined that flows exceed a depth of 1 foot along the southwest corner of the RWMS, which places this part of the RWMS in the AO zone.

For the remaining subbasins that could impact the RWMS and the proposed HWSU, flood hazard determinations were conducted assuming sheetflow conditions. This analysis, using FEMA methodology for sheetflow, concluded that depths of flow during the 100-year flow event were less than 1 foot. Thus, the RWMS and the proposed HWSU are not in a 100-year flood hazard as defined by FEMA.

Although the RWMS and the proposed HWSU facilities that are included in the RCRA Part B Permit Application are not within a 100-year flood hazard per FEMA definition (100-year flood depth at or greater than 1 foot), flow from a 100-year event could impact the facilities. Flood protection requirements are being evaluated.

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1.0 INTRODUCTION

1.1 Location

A flood assessment was conducted at the Radioactive Waste Management Site (RWMS) and the proposed Hazardous Waste Storage Unit (HWSU) in Area 5 of the Nevada Test Site (NTS) in Nye County, Nevada (Figure 1). In this report, the RWMS includes the Transuranic (TRU) Radioactive pad, Mixed-Waste Disposal Unit, and Pit 3 within the RWMS. The study area encompasses portions of the Massachusetts Mountains, the Halfpint Range, and the drainages of Barren Wash and Scarp Canyon.

1.2 Purpose

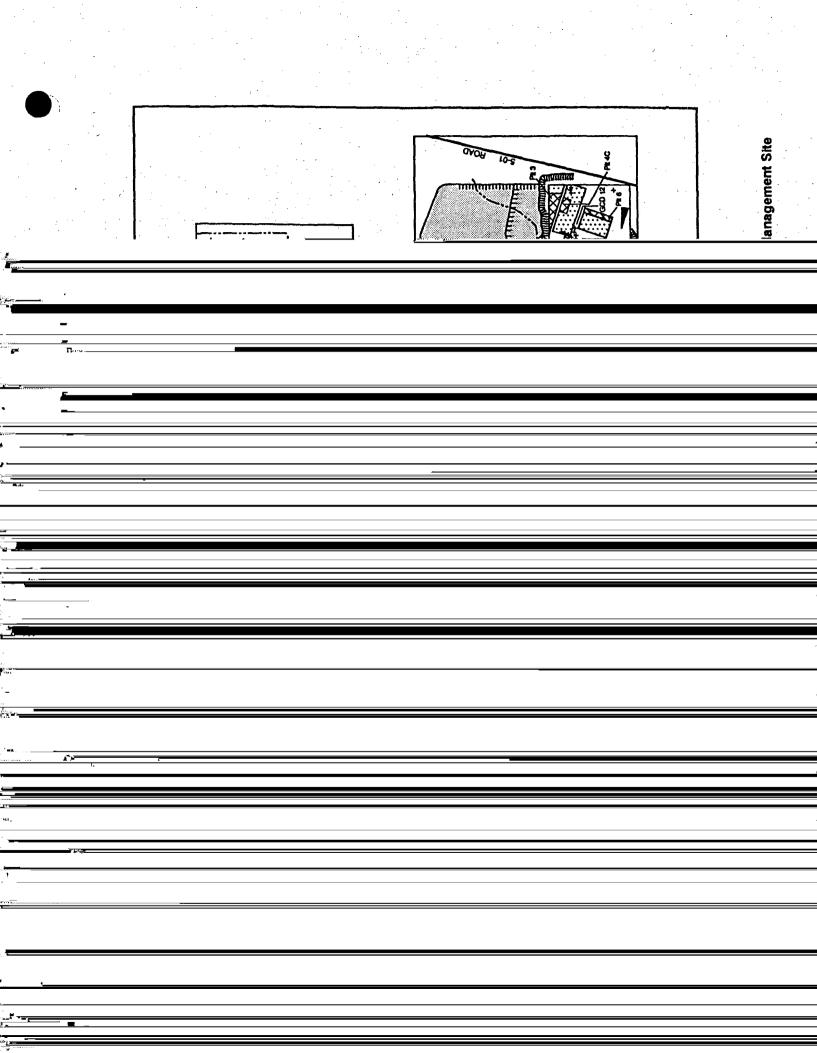
Flood assessment is one of the subtasks related to surficial geology studies at and near the RWMS. Surficial geology studies respond primarily to requirements and guidelines for site characterization found in federal regulations. The principal federal regulations and criteria pertaining to flooding with which the RWMS must comply are:

- Executive Order 11988 (Floodplain Management),
- 10 CFR 61.50 (Technical Requirements for Land Disposal Facilities),
- 40 CFR 264.18 (Location Standards for Hazardous Waste Management Facility),
- 40 CFR 270.14 (General Requirements for a Hazardous Waste Facility), and
- Department of Energy (DOE)/Nevada-341, Environmental Compliance Handbook, September 1990.

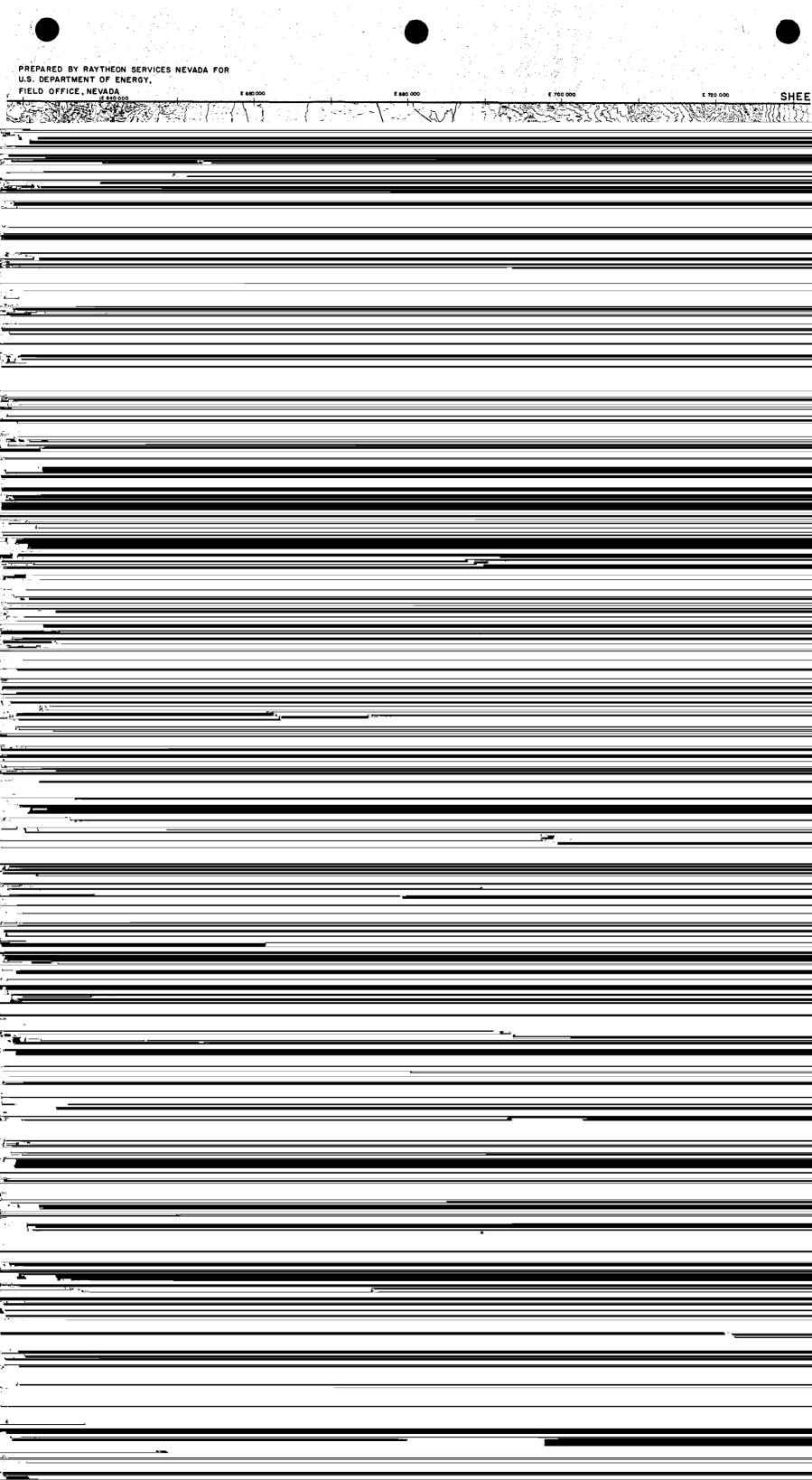
The RWMS must also comply with Nevada Administrative Code 444.8456 (Restrictions on Locations of Stationary Facilities for Management of Hazardous Waste; Exceptions). These regulations prohibit the placement of a hazardous waste facility in a 100-year floodplain. This subtask focuses on the potential 100-year flood hazard on the RWMS. Although the flood assessment subtask does not evaluate the erosion hazard over a geologic time scale (10,000 years), as required under 40 CFR 191.13 (Environmental Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level, and Transuranic Radioactive Waste; Final Rule), other subtasks are being conducted to gather information regarding erosion on the RWMS. These subtasks include detailed trench and surface mapping, alluvial structure, and seismic fault definitions.

1.3 Objective

The objective of this flood assessment was to determine the 100-year flood hazard on and near the Area 5 RWMS using the most site-specific and applicable approaches for the hydrologic and hydraulic analyses. This flood assessment was conducted to provide hydrologic and hydraulic information for flood protection design and to follow the criteria for flood hazard determination required by the Federal Emergency Management Agency (FEMA), as specified in 40 CFR 270.14.



1.4 Previous Studies





Profile Mountain Geologic Apex Canyon Old Fan Surface Bed Active "FEMA" Apex Channel Active Fan Bed Surface Unpredictable **Entrenched** Canyon Channel Flowpath

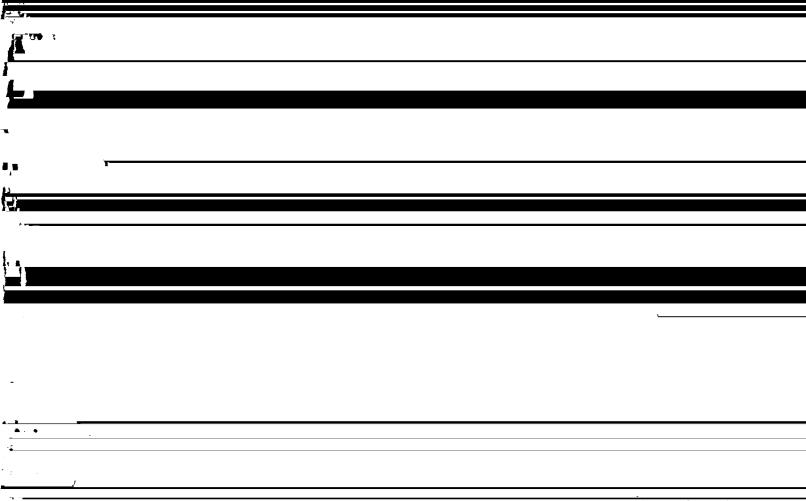
Figure 4. Idealized Alluvial Fan Profile (modified from French, 1989). The geologic apex is the intersection of the mountain front and the piedmont plain. The active "FEMA" apex is the point below which the flow of the main channel becomes unpredictable.

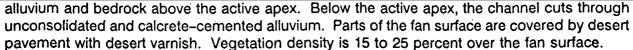
The Barren Wash Alluvial Fan is the dominant landform in the watershed. The proximal part of the fan (the area on the alluvial fan near the apex) is deeply entrenched by a stream channel. Significant parts of the fan surface are covered by desert pavement with desert varnish, and vegetation covers 15 to 25 percent of the surface. Erosion is the primary geomorphological process occurring on the proximal part of the fan, as shown by scalloping of the fanhead trench.

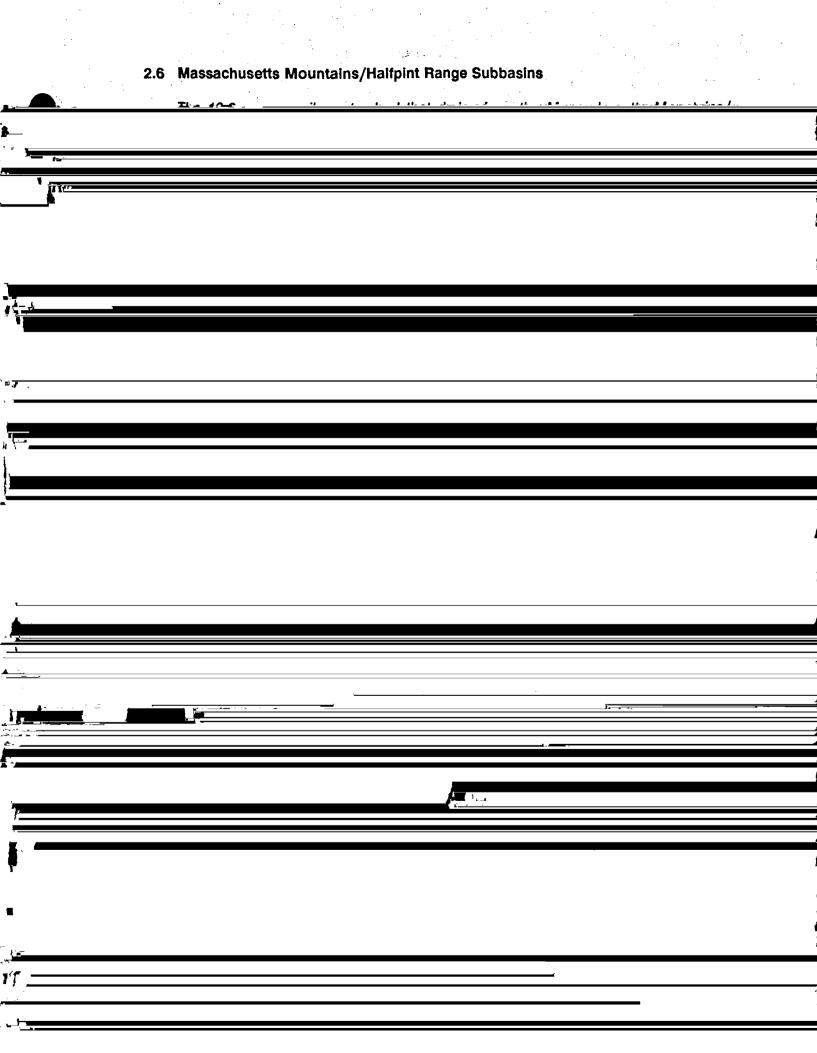
Continued trench incision has shifted deposition to a distal part of the fan (the outermost area, or lower zone of the fan). The Barren Wash channel captures the channel draining from the Massachusetts Mountains 1A (MM1A) subbasin at the southwestern corner of the Massachusetts Mountains (*Figure 3* and *Sheet 2*). At this point a new, secondary fan is being formed which extends east toward the RWMS and south to Frenchman Flat. The RWMS is located on the lower-mid part of this secondary fan.

2.4 Scarp Canyon Alluvial Fan

The Scarp Canyon watershed, located northeast and east of the RWMS, covers about 40.9-square miles (*Figure 2* and *Sheet 1*). This watershed drains onto Scarp Canyon Alluvial Fan from an area that extends north to Carbonate Ridge (French and Lombardo, 1984), west to the Massachusetts Mountains, and east to Raysonde Butte. The watershed is divided into two subbasins: Scarp Canyon 1 (SC1, 39.4-square miles), the drainage area above the active apex; and Scarp Canyon 2 (SC2, 1.5-square miles), the area between the channel that drains SC1 and the eastern boundary of Halfpint Alluvial Fan (*Figure 3* and *Sheet 2*).







the CCRFCD Manual were considered the best approach for estimating discharges for the flood assessment of the RWMS and vicinity for these reasons:

- a. The physical setting and flood-producing storms for the RWMS and vicinity are similar to those of Clark County;
- b. The eastern boundary of the study area is adjacent to the Clark County line;
- c. Local and federal agencies (e.g., FEMA) accept the methods in the CCRFCD Manual; and,
- d. Clark County is the nearest local jurisdiction with a hydrologic method based on region-specific information.

The Soil Conservation Service (SCS) unit hydrograph option in the HEC-1 computer program was used in the hydrologic models. The SCS unit hydrograph is widely used in rainfall-runoff models and is recommended as an option in the CCRFCD Manual. The input parameters required to run the HEC-1 computer model using the SCS unit hydrograph option are:

- precipitation parameters (depth of precipitation, storm duration and time distribution, and depth-area ratios);
- drainage area (total drainage area and subbasins);
- precipitation losses (curve numbers);
- lag time for each basin; and,
- channel routing parameters.

The procedure used to obtain these parameters generally followed the methods described in the CCRFCD Manual. The following sections provide an overview of how these parameters were determined and substantiate any deviations from the methods provided in the CCRFCD Manual. A detailed description of how these parameters are determined is in the CCRFCD Manual.

3.1.1 Precipitation

Rainfall events that cause flooding on the NTS and in southern Nevada are usually convectional storms. According to Christenson and Spahr (1980), the probable flood-generating storm in the NTS area would be from summer convectional storms. These flood-producing storms are normally characterized as short-duration (6-hours or less), high-intensity storms over a localized area. Methods regarding precipitation parameters in the CCRFCD Manual assume that summer convectional storms are the likely precipitation event to produce flooding in Clark County. In an analysis of precipitation records for southern Nevada, WRC Engineering and the COE determined that a 6-hour rainfall should be the design storm. A 6-hour mass curve (intensity of rainfall per 15-minute intervals over the 6-hour design storm) was developed and a relationship between precipitation depth and storm size (depth-area ratios) was determined. These parameters are discussed below in more detail.

a. Point Precipitation Values

As specified in the CCRFCD Manual, the design depths of precipitation for the 6-hour storm were taken from NOAA Atlas 2, Volume VII (1973) and are listed in Table 1.

Correction Factor

Corrected Point Rainfall (inches)

Table 1. Six-Hour Storm Point Precipitation Values and Correction Factors (CCRFCD Manual, 1990). Correction factors used to adjust precipitation values for design depths of precipitation for the six-hour storm.

NOAA Values

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	<u></u>		,	
1.1	2-Year, 6-Hour	0.70	1.00	0.70
	10-Year, 6-Hour	1.10	1.24	1.36
N .	100-Year, 6-Hour	1.60	1.43	2.43

The 100-year, 6-hour point precipitation value of 1.6-inches (NOAA Atlas 2, Volume VII, 1973) compares well with the 1.8-inch value generated from a figure developed by French (1983) for the Cane Springs precipitation gauge (Figure 5). The preliminary value of 2.6-inches for the 100-year, 24-hour storm taken from a statistical analysis of the rainfall data at Well 5b (*Figure* 5) by Reynolds Electrical & Engineering Co., Inc., (Barker [personal communication], 1992). This rainfall data compares well with the values listed in NOAA Atlas 2, Volume VII (1973). Locations of these gauges are shown on *Figure 2* and *Sheet 1*.

The CCRFCD Manual requires that the point precipitation values listed in NOAA Atlas 2, Volume VII (1973) be used to determine point precipitation; however, the CCRFCD Manual specifies that rainfall events above the 2-year storm be adjusted. *Table 1* shows the correction factors listed in the CCRFCD Manual. These correction factors were identified from studies conducted by WRC Engineering and COE for Clark County (CCRFCD Manual, 1990) based on available rainfall data, primarily from the Las Vegas Valley, so these factors may not be applicable for the RWMS study area.

French (1983) hypothesized that the southern part of Nevada can be divided into three precipitation zones: an excess zone, a transition zone, and a deficient zone (Figure 6). French (1983) indicates that the Las Vegas Valley is located in the excess zone, and the NTS is located in the transition zone. He further hypothesizes that the excess zone is a result of storms tracking up the Colorado River Valley, and the influence of the river on precipitation values lessens with distance away from the Colorado River Valley. The precipitation analysis by French (1983) and Barker (personal communication, 1992) support this hypothesis and suggest that the noncorrected precipitation values for the RWMS study area are more applicable than using the precipitation correction factors specified in the CCRFCD Manual. Hydrologic models in this flood assessment used the nonadjusted values in NOAA Atlas 2, Volume VII (1973); however, a discharge model was developed using the correction factors specified in the CCRFCD Manual to compare with the hydrologic models developed without the adjustment factors. The results of this comparison are discussed in Section 3.4, Hydrology Discussion.

b. Storm Duration and Time Distribution

Clark County has adopted two 6-hour storm distribution tables to be used to generate discharges (CCRFCD Manual, 1990). The two storm distributions defined in this manual are for areas less than or larger than 10-square miles. These storm distributions were used for the subbasins in the hydrologic models for the RWMS. A mass curve of the two storm distributions is shown in Figure 7.

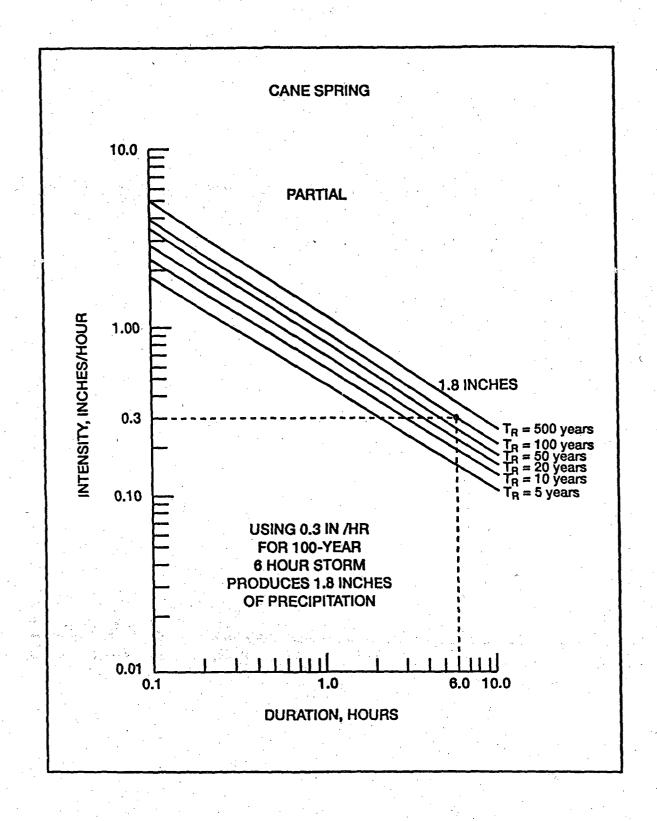


Figure 5. Intensity Duration Relationships for Various Return Periods, Cane Springs, Nevada Test Site, Nevada (modified from French, 1983). The 100-year, 6-hour point precipitation value of 1.6 inches compares well with the value from French, 1983.

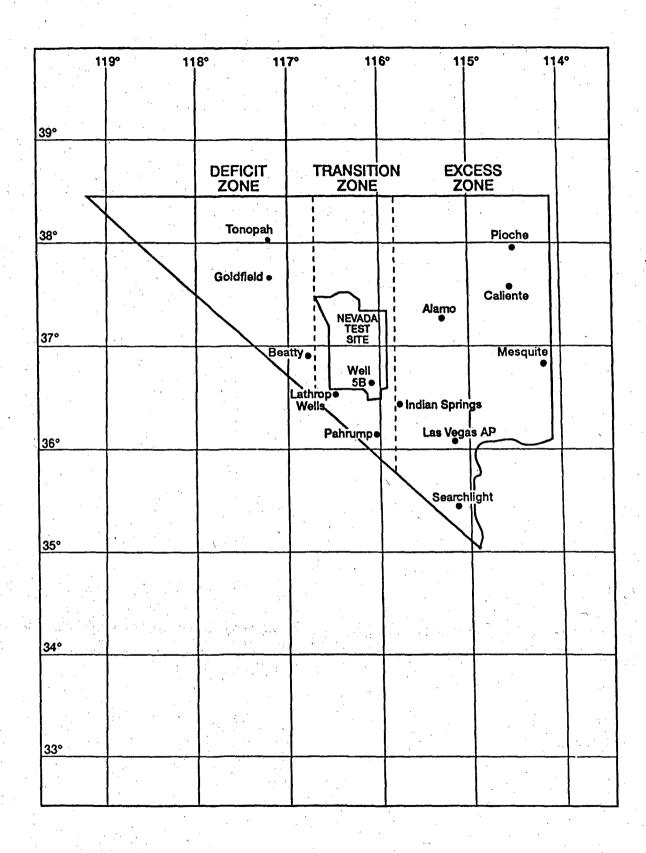
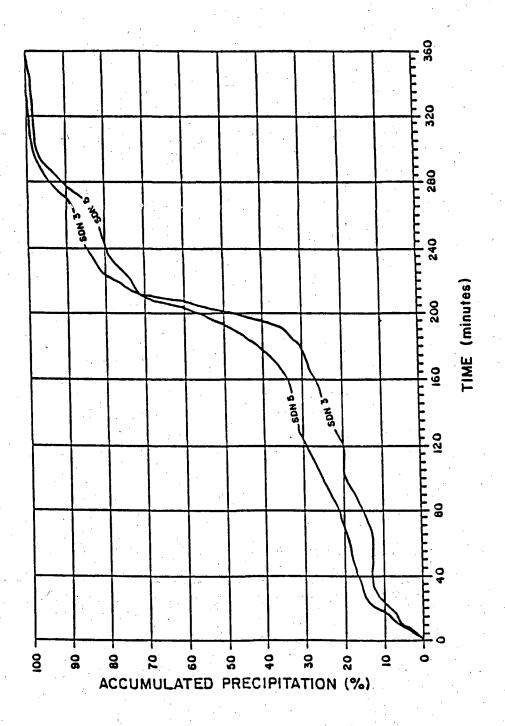


Figure 6. Hypothesized Zones of Precipitation in Southern Nevada (modified from French, 1983). The NTS is located in the transition zone of precipitation.

SIX-HOUR DESIGN STORM DISTRIBUTIONS



Notes:

- 1. For drainage areas less than 10 square miles in size, use SDN 3.
- 2. For drainage areas equal to or greater than 10 square miles in size, use SDN 5.

Figure 7. Storm Distributions (CCRFCD Manual, 1990). Storm distribution curves are selected based on drainage basin size.

c. Depth-Area Ratios

During a flood-producing storm, usually a convectional storm in this region, point precipitation values probably would not apply to an entire drainage basin. Depth-area ratios have been developed for arid regions which reduce the point precipitation value for a watershed as a function of area. Clark County uses the depth-area ratios that were developed by the COE for Clark County and vicinity (Table 2). These depth-area ratios are a modification of ratios developed by Zehr (1984) on arid watersheds in Arizona and New Mexico. Ratios in the CCRFCD Manual were used in the hydrologic model for the RWMS.

3.1.2 Drainage Areas

The area of each drainage basin defined in the hydrologic model was delineated using 7.5- and 15-minute United States Geological Survey (USGS) topographic quadrangle maps of the area (Figures 2 and 3; Sheets 1 and 2), along with 1:6,000 orthophotos with a 10-foot contour interval that were developed for the area. Basin delineations were verified by field observations and study of color and infrared aerial photos. The area of each subbasin was determined using a planimeter. The drainage area, and the other watershed parameters for each subbasin used in the HEC-1 model, are listed in Table 3. The USGS topographic maps used to define the drainage area are:

15-minute Topographic Quadrangles (USGS):

- Papoose Lake (1952)
- Frenchman Lake (1952)
- Cane Spring (1952)
- Topopah Spring (1952)
- Tippipah Spring (1952)

7.5-minute Topographic Quadrangles (USGS):

- Plutonium Valley (1986)
- Frenchman Lake (1986)
- Yucca Lake (1986)
- Cane Spring (1986)

3.1.3 Precipitation Losses

Precipitation losses were determined using the SCS curve number methodology and the applicable table (Table 4) found in the CCRFCD Manual. The following information is required to determine a curve number for a specific subbasin:

- hydrologic soil group;
- vegetation type; and
- percent ground and vegetation cover.

The following procedures were used to obtain this information:

1. The percent of bedrock and alluvium was determined for each subbasin using aerial photos and geologic and topographic maps. Bedrock areas of the subbasins were assigned as hydrologic soil group D. This soil group has high runoff potential and applies to

Table 2. Six-Hour Precipitation Depth-Area Reduction Factors (CCRFCD Manual, 1990).

Depth-area ratios reduce the point precipitation value for a watershed as a function of area.

Drainag	ge Area (mi²)	Reduction <u>Factor</u>	100-Year (in.)	10-Year (in.)	2-Year (in.)
	0.01	1.00	1.60	1.11	0.70
· · · · .	1	0.97	1.55	1.07	0.68
	10	0.86	1.38	0.95	0.60
	20	0.79	1.26	0.87	0.55

50	0.68	1.09	0.75	0.48
100	0.60	0.96	0.66	0.42

Table 3. Watershed Parameters. Watershed parameters were delineated using topographic maps, aerial photos, and field investigations.

		C	urve Numbe	ers	
Watershed Name	Basin Area (mi²)	AMC I	AMC II	AMC III	Lag Time (hrs)
MM1A	0.9	63	80	90	0.31
BW1	60.5	67	83	93	2.10
BW2	20.8	63	80	90	0.90
MM1B	2.1	59	77	87	0.48
MM2	1.4	62	79	89	0.47
HP1A	0.8	70	85	95	0.30
HP1B	1.0	60	78	88	0.51
HP2	1.2	60	78	88	0.51
HP3	1.7	66	82	92	0.59
HP4	3.3	62	79	89	0.52
HP5	1.2	62	79	89	0.30
HP6	2.2	63	80	90	0.55
HPFA	0.3	59	77	87	0.33
HPFB (1.6	59	77	87	0.44
SC1	39.4	66	82	92	2.10
SC2	1.5	59	77	87	0.48

Table 4. Runoff Curve Numbers (Semiarid Rangelands¹) [CCRFCD Drainage Manual, 1990 {reference SCS TR-55, USDA, June 1986}]. Hydrologic soil group, vegetation type, and percent of ground cover determine curve numbers.

Cover Description		Curve Numbers for Hydrologic Soil Group			
Cover Type	Hydrologic Condition ²	A ³	В	С	D
Herbaceous mixture of grass, weeds,	Poor		80	87	93
and low-growing brush, with brush the	Fair		71	81	89
minor element	Good		62	74	85
Oak-aspen-mountain brush mixture of	Poor		66	74	79
oak brush, aspen, mountain mahogany,	Fair		48	57	63
bitter brush, maple, and other brush	Good		30	41	48
Pinyon-juniper-pinyon, juniper, or both;	Poor	••	75	85	89
grass understory	Fair		58	73	80 ~
	Good		41	61	71
Sagebrush with grass understory	Poor		67	80	85
	Fair		51	63	70
	Good	· 	- 35	47	55
Desert shrub-major plants include	Poor	63	77	85	88
saltbush, greasewood, creosote bush,	Fair	55	72	81	86
blackbrush, bursage, palo verde, mesquite, and cactus	Good	49	68	79	84

¹ Assume Antecedent Moisture Condition II.

Fair: 30 to 70% ground cover. Good: > 70% ground cover.

areas with shallow soils or exposed bedrock. The alluvium is mostly sand and was assigned as hydrologic soil group B based on the preliminary surficial map by Rawlinson (1991), Romney (1973), and extensive field investigation conducted by the authors.

- 2. The cover type for the subbasins was determined to be desert shrub based on descriptions given in *Table 4*, field investigation, and study of aerial color and infrared photos.
- 3. The hydrologic condition was determined to be poor based on 30 ground surveys conducted on the alluvium. Ground cover ranged between 5 and 30 percent (*Table 4*). Results of these surveys were assumed to be representative of all subbasins. This assumption

² Poor: < 30% ground cover (litter, grass, and brush overstory).

³ Curve numbers for Group A have been developed only for desert shrub.

was verified by study of aerial photos and field investigations. Because of the very steep slopes and minimal or nonexistent soil, bedrock areas have less vegetation than alluvial areas; therefore, the hydrologic condition of the bedrock areas was also classified as poor.

According to the CCRFCD Manual, curve numbers for precipitation losses should be determined assuming an antecedent moisture condition of II (AMC-II). Antecedent moisture condition is dependent on the antecedent rainfall. The antecedent rainfall is the amount of rainfall between 5 and 30 days preceding a flood-producing storm. AMC-I assumes the soil is dry, and AMC-III assumes the soil is near or at saturation; AMC-II is halfway between AMC-I and AMC-III. The CCRFCD Manual designates AMC-II because data required to determine the antecedent moisture condition for an entire area are not quantifiable.

Assuming AMC-II, curve numbers for the alluvium and bedrock were 77 and 88, respectively. The curve number for each subbasin was determined by taking the weighted average between the percentage of alluvium and bedrock present in each subbasin. Curve numbers for each subbasin for AMC-II, AMC-II, and AMC-III are listed in *Table 3*. Hydrologic models in this study developed to estimate the 2-year and 10-year discharges assumed the antecedent moisture conditions were AMC-II. The 100-year hydrologic models developed for this study assumed conditions ranging between AMC-II and AMC-III. The results from all the models and the justification for varying the curve numbers per antecedent moisture conditions are addressed in Section 3.4, *Hydrology Discussion*.

3.1.4 *Lag Time*

In the SCS unit hydrograph method, only one input parameter, the lag time, is required. The CCRFCD Manual uses the lag time equation from the U.S. Bureau of Reclamation (Cudworth, 1989) for subbasins greater than 1-square mile:

TLag -
$$20K_n(\frac{LL_c}{S^{1/2}})^{1/3}$$

where:

TLag = the lag time (hours) between the center of mass of rainfall excess and the peak of the unit hydrograph.

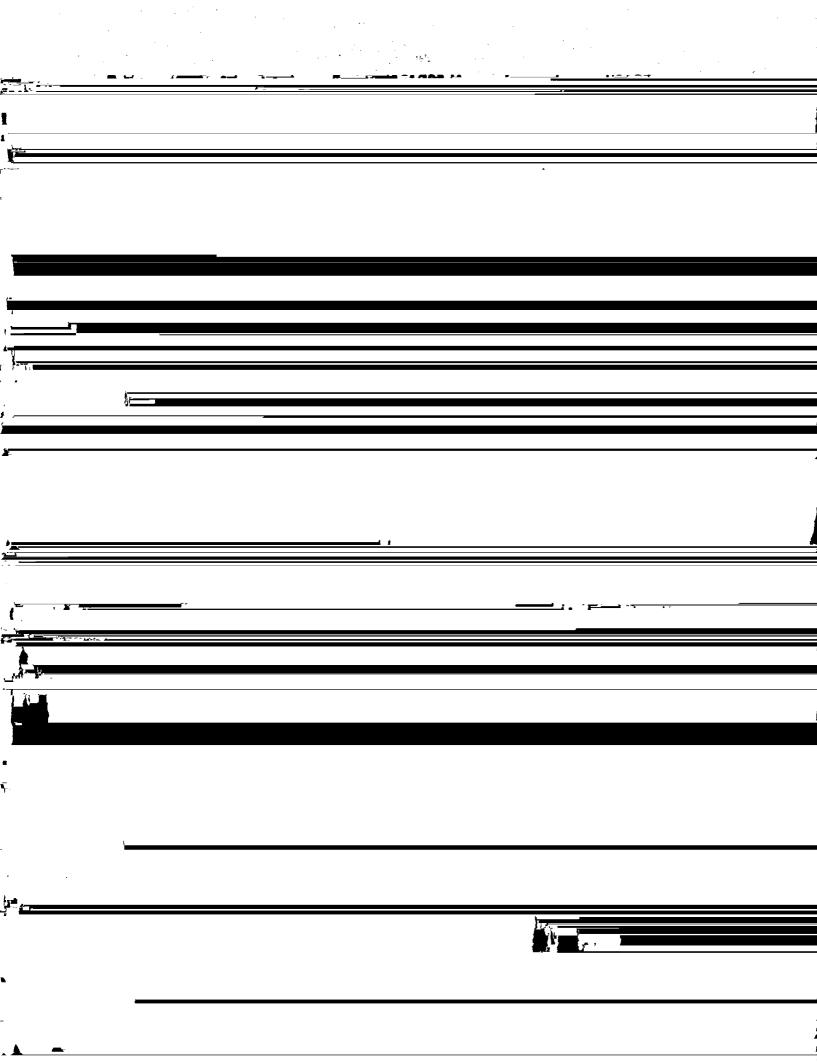
= the Manning roughness factor (dimensionless) for the basin channels.

= the length of the longest watercourse (miles) within the subbasin.

e the length along the longest watercourse (miles) measured upstream to a point opposite the centroid of the basin.

S = the average slope of the longest watercourse (feet per mile).

As indicated in the CCRFCD Manual, K_n is subjective. Therefore, criteria listed in Table 604 in the CCRFCD Manual (Table 5) are recommended and were used for this study. Characteristics of the subbasins fell halfway between the "n" value description for 0.03 and 0.05. Parameters used to determine the lag time are listed in Table 6. The L and S values for each



subbasin were determined using a map wheel on the watershed maps (Sheets 1 and 2). The L_c value was determined using a planimeter to find the centroid of each subbasin. A point on the longest watercourse of each subbasin which was closest to the respective centroid was selected.

3.1.5 Channel Routing

The Muskingum routing method was used for routing reaches. This routing method requires three parameters: x, K, and the integer step. The weighting factor (x) expresses the amount of attenuation of the flood wave within the reach (Dunne and Leopold, 1978), and was determined using criteria cited by the Cudworth (1989). The Muskingum coefficient (K) accounts for the translation of the peak flow for the entire channel reach. This coefficient K is directly related to the length and the average velocity of the reach. The average channel velocity is determined using the Manning Equation. The Manning roughness coefficient was chosen based on field observations. Channel geometry was determined through field measurements. (The integer step and routing reach were determined so that the total travel time through the reach would be equal to K.) Only three reaches were routed in the models. Table 7 lists the routing parameters for these reaches.

Transmission losses for the routing reaches are ignored in the models. Variability of infiltration rates along a channel reach can be extensive; thus, these losses over an entire reach are difficult to quantify. Ignoring these losses adds another conservative assumption into the model.

3.2 Hydrologic Models

Seven hydrologic models were developed using the HEC-1 computer program to determine discharges for this flood assessment (Table 8). All the models have the same hydrologic parameters, with the exception of point precipitation values and curve numbers. The differences between the models are explained in each model description (*Table 8*). Output from the seven hydrologic models are located in Appendix A.

3.2.1 Model Layout

The overall watershed that could impact the RWMS was divided into 16

Table 7. Routing Parameters. The Muskingum routing method was used for routing reaches.

Reach name	Integer Step	Storage Constant (K)	Weighting Factor (X)
HP1A to CPA	9	0.43	0.2
HP6 to CPD	5	0.27	0.2
CPD to CPE	8	0.39	0.2

Integer Step:

The integer step is the number of subreaches for the Muskingum routing in the

HEC-1 models.

Storage Constant (K): The Muskingum "K" coefficient is the travel time (hours) through

the reach.

Weighting Factor (X): The weighting factor expresses the amount of attentuation of the

flood wave within the reach.

Table 8. Hydrologic Models. Hydrologic models were developed for the 2-year, 10-year, and 100-year flood events.

	100-Year Hydrologic Model
RWMS.OUT	Point precipitation values were taken from NOAA Atlas 2, Volume VII. Curve numbers were developed assuming AMC-II.
RWMSCN.OUT	Point precipitation values were taken from NOAA Atlas 2, Volume VII. Curve numbers for all basins were increased by 5 to account for an AMC greater than II.
BINESON OLIT	Datus manatulisastam valvan viara talvan from NOAA Atlan a Valvima VIII. Cimia

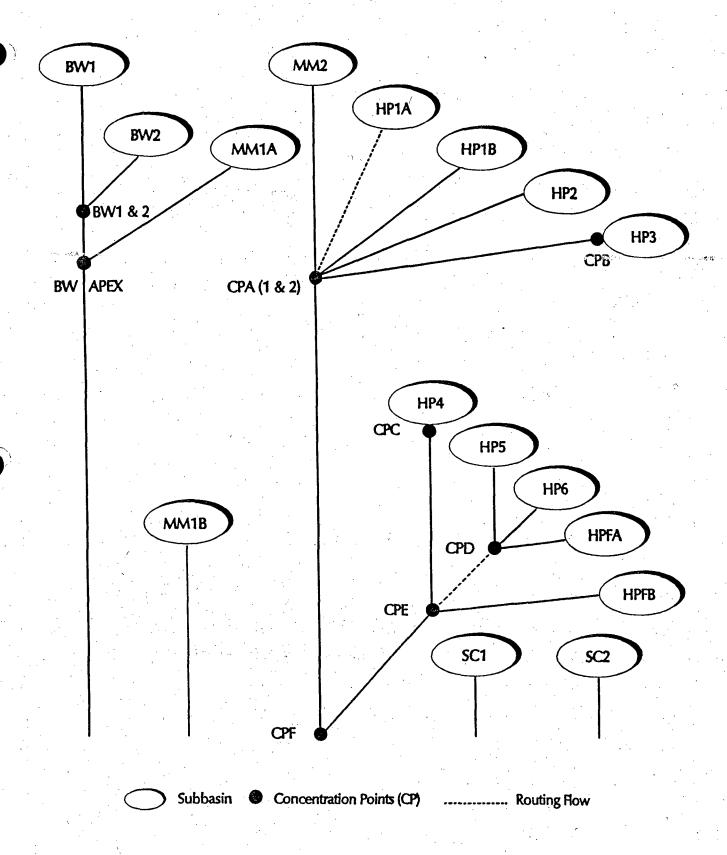


Figure 8. Schematic Diagram of Stream Network. This diagram shows how the 16 subbasins were combined in the HEC-1 models.

Another conservative assumption pertaining to subbasin HPFB was made in the model layout for a part of this subbasin that drains directly towards CPE. Difficulty in determining the percentage of discharge that could reach the RWMS from this subbasin led to the assumption that the entire subbasin would drain towards the RWMS.

Figure 8 shows flow from BW Apex, MM1B, SC1, and SC2 not connected to the major concentration points. Flow from BW Apex was not connected because flow from this drainage does not currently impact the RWMS; however, channel avulsions can potentially occur during a flood, thus directing flow towards the RWMS. This potential is addressed in Section 4.2, Results and Discussion of Flood Hazard Determination. Subbasin MM1B encompasses the Barren Wash Alluvial Fan, and flow that falls directly onto the fan would not drain towards the RWMS.

Subbasin SC1 is the Scarp Canyon watershed. The concentration point for this watershed is the aper of the Scarp Canyon Alluvial Fan. Flow from this watershed does not impact the RWMS, as shown in the Section 4.2, Results and Discussion of Flood Hazard Determination. Subbasin SC2 is a portion of the nonactive fan surface composed of sediments deposited by the Scarp Canyon channel. Because the channel has become entrenched and has extended the active apex approximately 2.5-miles down the existing fan surface, runoff from this surface would be sheetflow and, as indicated by the topography (Figure 3 and Sheet 2), drains

away from the RWMS.

3.2.2 Concentration Points

The concentration point locations were determined to provide discharges at the most appropriate location for the hydraulic analysis (*Figures 2* and 3 and *Sheets 1* and 2). Concentration points were selected for sheetflow locations and at the active apexes of the alluvial fans. In the case of sheetflow, with the exception of CPC and CPD, the concentration points were spread across the area of potential flood impact with the RWMS. CPC was selected where all water from subbasin HP4 would be funneled southwest between subbasins HP4 and HPFB towards the RWMS. CPD was selected where water from subbasins HP5, HP6, and HPFA would be concentrated together before being routed to CPE.

3.3 Hydrology Results

Discharges of key concentration points from the seven models used in this analysis are listed in Table 9.

Discharges from the models RWMS2.OUT, RWMS10.OUT, and RWMSW.OUT (2-year, 10-year, and 100-year discharges, respectively) were used in the analysis to determine the flood hazard zones for the Barren Wash, Scarp Canyon, and Halfpint alluvial fans. Discharges from RWMSW.OUT were used to evaluate the 100-year sheetflow and shallow concentrated flow that could impact the RWMS. Justification for choosing these models is discussed in the following section.

3.4 Hydrology Discussion

Although only three models were used in the flood assessment, a total of seven models were developed and evaluated in this study. A two-step approach was used to select the appropriate models for the 2-year, 10-year, and 100-year discharges. The following paragraphs provide a description of this approach.

Discharges From HEC-1 Models at Key Concentration Points. The 100-year discharges from RWMSW.OUT were used in the flood hazard determination. Table 9.

ear Dischar	100-Year Discharges (cfs)	8	8
VMSW.C	RWMSW.OUT	100	
6,018	9		3,513 6,
1,229	1,2	786 1,2	•
1,757	1,7	1,126 1,7	
624	9	420 6	
984		626 6	
884	ω.	570	
1,819	1,8		1,180 1,8
2,396	2,3		1,462 2,3
3,498	3,4	•	2,178 3,4

^{*}Barren Wash Apex **Scarp Canyon Apex

NOTE: Discharges were calculated using the HEC-1 computer program and do not represent significant figures.

The first step focused on the hydrologic model (HEC-1) for the 2-year flood. In arid regions, such as the RWMS location, it is common that no flow will occur in washes for several years; therefore, the 2-year model-generated discharges for the subbasins should be close to zero. The 2-year discharges from RWMS2.OUT (*Table 9*) were low, less than 25 cubic feet per second. These discharges from RWMS2.OUT appear reasonable so no other model was developed for the 2-year flood.

To verify the model-generated discharges for the 10-year and 100-year floods, another step was required. This step compared the skew coefficient developed from model-generated discharges and the regional skew coefficient (Water Resource Council [WRC] 17B, 1981). If the hydrologic models are producing reasonable discharges, then the skew coefficient from these models should be close to the regional skew coefficient.

A major assumption in using skew coefficients is that the relationship between discharge and return period must follow a Log-Pearson Type III (LPIII) probability distribution, as specified in WRC (1981). The FEMA FAN computer program (1990) contains a subroutine that calculates skew coefficients using a least-square fit and a LPIII probability distribution. This program calculated skew coefficients for specific concentration points using model-generated discharges. This program requires discharges for a minimum of three return periods to calculate the skew coefficient. (In this analysis the 2-year, 10-year, and 100-year model-generated discharges were entered into the FAN program.)

WRC (1981) contains a map which shows the regional skew coefficients for the country (Figure 9). According to the information on this map, the skew coefficient for washes on the NTS should be near zero. A zero skew coefficient means that if discharge versus probability were plotted on log-probability paper, then the flood frequency curve would plot as a log-normal distribution (a straight line). Preliminary results from a study by the USGS using stream gage data gathered after 1981 also support a zero skew for this region (Hjalmarson [personal communication], 1992).

The first three models that were evaluated using the skew comparison approach were RWMS2.OUT, RWMS10.OUT, and RWMS.OUT (Model Set 1). These models were developed using the noncorrected precipitation values from NOAA Atlas 2, Volume VII (1973) and followed the methods in CCRFCD Manual for the remaining input parameters. Discharges at the apexes of the Barren Wash, Halfpint, and Scarp Canyon alluvial fans were evaluated. Discharges at these apexes were entered into the FAN program to determine the skew coefficients. The skew coefficients, as shown in Table 10, were negative and were not close to zero. The discharges in this set must be adjusted to move the skew coefficients closer to zero. The 2-year model (RWMS.OUT2) was determined to generate reasonable results; therefore, adjustment must occur either to the 10-year, 100-year or both models.

Modification of curve numbers in the 100-year model were evaluated first. Two additional 100-year models were created from the original 100-year model (RWMS.OUT): RWMSCN.OUT and RWMSW.OUT. In RWMSCN.OUT, curve numbers were 5 greater than the original model, and in RWMSW.OUT, curve numbers were 10 greater than the original model. Increasing the curve numbers by 5 assumes a antecedent moisture condition between AMC-II and AMC-III; increasing the curve numbers by 10 assumes AMC-III.

Using these models, two additional model sets were developed with these two models: Model Set 2 (RWMS2.OUT, RWMS10.OUT, and RWMSCN.OUT) and Model Set 3 (RWMS2.OUT, RWMS10.OUT, and RWMSW.OUT). The 2-year, 10-year, and 100-year

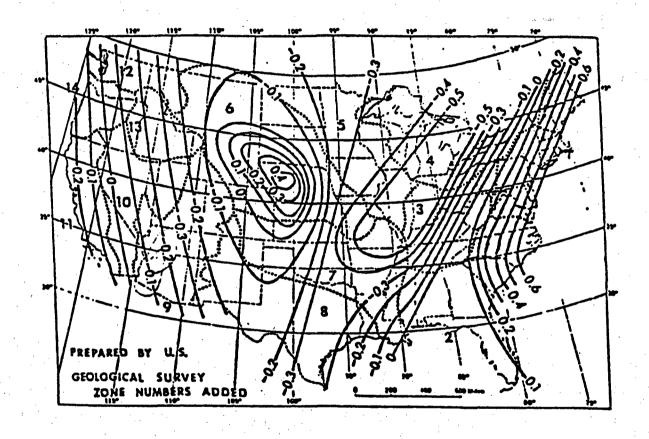


Figure 9. Generalized U.S. Skew Coefficients (WRC [1981]). The Nevada Test Site is located in an area with a zero skew coefficient value.

Table 10. Skew Coefficients From Different Model Sets. Model Set 3 generated skew coefficients closest to zero for the three apexes.

Apex Locations	Model Set 1	Model Set 2	Model Set 3	Model Set 4
Barren Wash	-1.2	-0.6	-0.1	-1.2
Scarp Canyon	-1.2	-0.7	-0.3	-1.3
Halfpint	-1.1	-0.4	0.1	-1.0
Return Period	Model Set 1	Model Set 2	Model Set 3	Model Set 4
2-Year Model	RWMS2.OUT	RWMS2.OUT	RWMS2.OUT	RWMS2.OUT
10_Year Model	RWMS10.OUT	RWM\$10.OUT	RWMS10.OUT	RWMS10C.OUT
100-Year Model	RWMS.OUT	RWMSCN.OUT	RWMSW.OUT	RWMSC.OUT

The 10-year and 100-year hydrologic models could be modified by adjusting the curve numbers, depth of precipitation, or lag times. Of these three parameters, curve numbers have the widest variability because they are dependent on antecedent moisture conditions, as indicated in *Table 3*. Curve numbers for the subbasin in this study (*Table 3*) can range in the 50's and 60's under dry soil conditions (AMC-I) to the high 80's and low 90's (AMC-III) for saturated conditions. The CCRFCD Manual assumes AMC-II because antecedent moisture conditions for a drainage basin are impossible to quantify and a standard approach is required in Clark County to assure consistent analysis and design in drainage facilities and structures. The assumption of AMC-II may be reasonable for the 2-year flood event, as reflected in RWMS2.OUT, but may not be for the 10-year and 100-year flood events. For 10-year floods or greater, the antecedent moisture condition as well as rainfall may contribute to flooding.

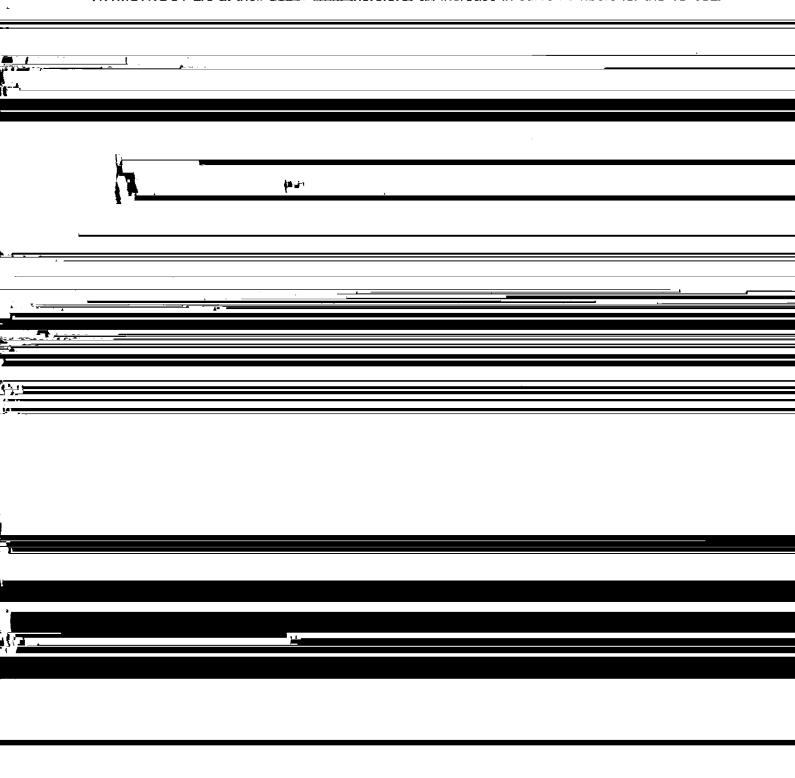
Precipitation depth and lag times are not as variable. Variation from the precipitation depths in NOAA Atlas 2, Volume VII is not supportable because analysis of precipitation data in the study area (French, 1983; and Barker [personal communication], 1992) do not vary substantially from the values in NOAA Atlas 2, Volume VII, and any variation to precipitation data would be difficult to support. Variability in lag time is limited because three of the four parameters (L, L_c, and S) are measured from a topographic map, and significant variations in the K_n are not defensible using the methods described in the CCRFCD Manual (*Table 5*). Therefore, the curve numbers in the models were considered the most reasonable parameter to modify.

Modification of curve numbers in the 100-year model were evaluated first. Two additional 100-year models were created from the original 100-year model (RWMS.OUT): RWMSCN.OUT and RWMSW.OUT. In RWMSCN. OUT, curve numbers were 5 greater than the original model, and in RWMSW.OUT, curve numbers were 10 greater than the original model. Increasing the curve numbers by 5 assumes an antecedent moisture condition between AMC-II and AMC-III; increasing the curve numbers by 10 assumes AMC-III.

Using these models, two additional model sets were developed with these two models: Model Set 2 (RWMS2.OUT, RWMS10.OUT, and RWMSCN.OUT) and Model Set 3 (RWMS2.OUT, RWMS10.OUT, and RWMSW.OUT). The 2-year, 10-year, and 100-year discharges for each model set were entered into the FAN program. The skew coefficients of the

apexes of the three fans were closer to zero (Table 10). Model Set 3 generated skew coefficients closest to zero for the three apexes. These models from Model Set 3 were used to define the 100-year flood hazards in this flood assessment.

The 10-year model was not modified because an increase in the curve numbers would require a corresponding increase in the curve numbers for the 100-year model to maintain a zero skew. Assuming AMC-III (saturated conditions), the discharges generated from RWMSW.OUT are at their upper limit: therefore, an increase in curve numbers for the 10-year



4.1 Hydraulics and Flood Hazard Determination Methodology

4.1.1 FEMA Alluvial Fan Methodology

Flooding from the Barren Wash, Scarp Canyon, and Halfpint alluvial fans could impact these facilities. Hydraulic processes on alluvial fans are different than in riverine channels. Alluvial fan flooding, as described by FEMA (1991), ". . . is characterized by high-velocity flows; active processes of erosion, sediment transport, and deposition; and unpredictable flowpaths." Channel geometry and direction on alluvial fans can change in direct response to a flood discharge. Field investigations and study of topographic maps and aerial photos of the Barren Wash, Scarp Canyon, and Halfpint alluvial fans support this description because flowpaths are unpredictable, soil development is weak, and evidence of recent erosion and deposition is present.

FEMA (1991) states that if flowpaths below the active apex cannot be predicted (which is the case for the Barren Wash, Scarp Canyon, and Halfpint alluvial fans), the FEMA Alluvial Fan Methodology must be applied to evaluate the 100-year flood hazard. This methodology, which is a modification of the method proposed by Dawdy (1979), relates probability of discharges at the apex to probability of channel depths and flow velocities that occur on the alluvial fan.

According to Dawdy (1979), flood flow from the apex of a typical alluvial fan does not spread evenly over the fan surface, but is instead confined to a surface or channel that carries the flood waters from the apex to the toe of the fan (Figure 10). The active apex is selected at the point where the flowpath becomes unpredictable, and flow is no more likely to follow an existing channel than create a new path. In the upper region of an alluvial fan, flow is confined to a single channel where the depth and width of the channel is a function of the flow itself. In general, flow occurs at critical depth and velocity as a result of steep slopes associated with this upper region. As slopes decrease towards the mid and distal parts of the fans, channel bifurcation can occur resulting in a multiple-channel region. Dawdy (1979) did not incorporate a multiple-channel region into his methodology. FEMA (1991) modified the Dawdy methodology to address multiple-channel regions of alluvial fans.

Key assumptions of the FEMA Alluvial Fan Methodology follow (French, 1989):

- 1. The location of the flood event channel on the fan surface is random. Furthermore, the probability of the channel passing through any given point on a contour is uniform.
- 2. Flow occurs in flow-formed channels. Well-defined channels result from the subsequent erosion from this process.
 - a. Incised channels do not exist previous to the first flow event.
 - b. Existing channel capacity is not adequate to convey the flow, and overbank flooding occurs.
- 3. The width and depth of the channel is a function of discharge.
- 4. Transmission losses are not considered.
- 5. On-fan precipitation is not considered.

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Active Fan Apex Channel Channels Zone Range of Flow Paths Locations Fan Toe

Figure 10. Alluvial Fan Plan View (modified from French, 1989). Plan view of an idealized alluvial fan showing the single channel, multiple channel, and sheetflow regions.

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- 6. The alluvial fan is active; e.g., net deposition is occurring in both time and space and avulsions (the migration of channel from one location to another during a single event) are occurring.
- 7. Flood discharge frequency distribution must be available at the apex of the alluvial fan.

Field observations, a study of topographic and geologic maps, aerial photographs, and examination of historic records were made during the flood assessment of these alluvial fans. Sources of flooding were defined, an apex selected, active fan boundaries delineated, entrenched reaches of channels located and measured, and locations of barriers to flow determined.

The methodology used for defining flood hazards on alluvial fans incorporates FEMA's computer model, FAN (1990). Delineation of the 100-year flood hazard using the FEMA FAN Model requires the following parameters and assumptions:

- Discharge information
- Apex location
- Fan boundaries and dimensions
- Potential flow obstructions and/or diversions
- Multiple channel region parameters:
 - Manning roughness coefficient
 - Slope

The FAN model requires that at least three discharges of different return periods be used to define the flood hazard zones. The 2-year, 10-year, and 100-year flood discharges for the Barren Wash, Scarp Canyon, and Halfpint alluvial fans were taken from the HEC-1 models labeled RWMS2.OUT, RWMS10.OUT, and RWMSW.OUT, respectively (*Table 9*). Discharges calculated by the HEC-1 models for CPBWAPEX or CPBW1&BW2 (*Figure 8*), whichever were greater, were used as the discharges at the apex of the Barren Wash Alluvial Fan in the FAN model. Discharges used in the FAN model for Scarp Canyon were taken from the HEC-1 models at the active apex of Scarp Canyon (Subbasin SC2). Discharges for Halfpint Alluvial Fan were taken from CPE as calculated within the HEC-1 model, and were assumed to have originated from the fan apex. All approaches for selecting discharges at the apexes are considered to be conservative.

Apex locations and fan boundaries were determined from aerial photographs; available topographic, geologic, and surficial maps; and field investigations. Apexes were located using the FEMA definition for an active apex. Location of the apexes for Barren Wash, Scarp Canyon, and Halfpint alluvial fans are shown in Figure 11 and Sheet 3.

Potential flow obstructions and diversions such as roads, buildings and other structures which can prevent flooding in some areas and increase flooding in others must be designated. In this flood assessment, all barriers such as Mercury Highway, 5–01 road, all secondary roads, the nonengineered berms surrounding the RWMS perimeter, and all disturbed areas diverting flow away from the RWMS were ignored. Quantification of the diversion would be difficult. Assuming that all flow can reach the RWMS produces a more conservative flood analysis.

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APPENDIX B FEMA FAN MODEL OUTPUT

APPENDIX C HEC-2 MODEL OUTPUT

APPENDIX D SHEETFLOW CALCULATIONS

4.2 Results and Discussion of Flood Hazard Determination

Using the methods described in the previous section, the 100-year flood hazard areas were defined on the topographic maps (*Figure 11* and *Sheet 3*). Zone AO and Zone X were used to denote the flood hazards in the vicinity of the RWMS.

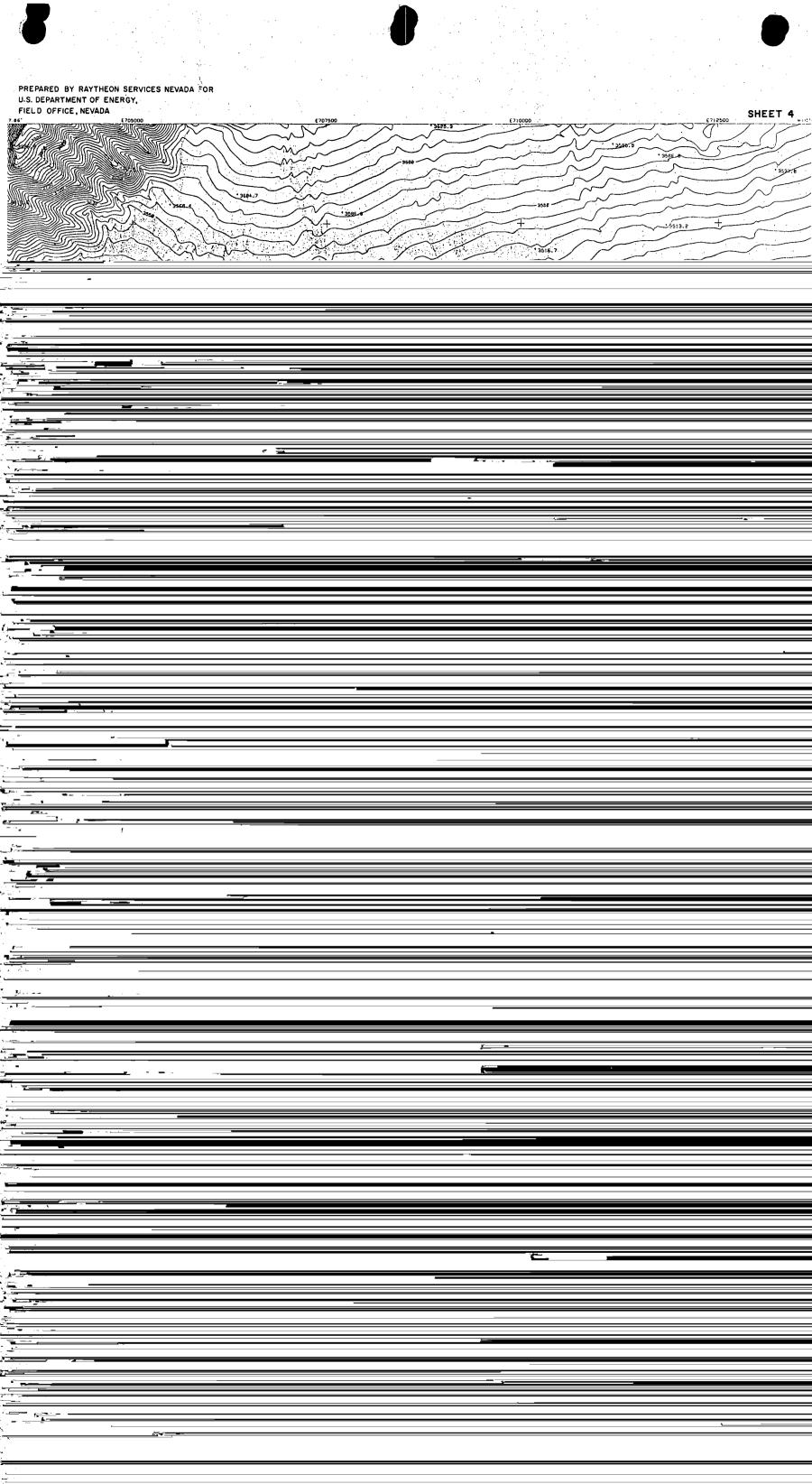
FEMA designates alluvial fan, shallow concentrated flow, and sheetflow areas with a 100-year flood depth of greater than 1 foot as a Zone AO. FEMA (1990) defines Zone AO as the area of 100-year shallow flooding where average depths are between 1 and 3 feet. For alluvial fans, anywhere throughout the zone there is a probability of 0.01 that a channel can occur at the designated depth with flow at the designated velocity. Zone X, shown on Figure 11 and Sheet 3 and Figure 12 and Sheet 4, represents areas outside the 100-year flood hazard and/or areas of the 100-year shallow flooding (sheetflow or shallow concentrated flow) where average depths are less than 1 foot. A Zone X delineation does not mean that floods will not occur within this zone. For this reason, flood hazard protection must be addressed.

4.2.1 Alluvial Fan Flooding

The 100-year flood hazard zones for the Barren Wash, Scarp Canyon, and the Halfpint fans are shown on *Figure 11* and *Sheet 3*. The 100-year flood hazard for the RWMS and its immediate vicinity is also shown on an 1:6,000 orthophoto (*Figure 12* and *Sheet 4*).

Using the FEMA Fan Methodology, the southwest corner of the RWMS is within the 100-year flood hazard zone, designated as Zone AO; depth 1 foot; velocity 3 feet per second, of the Barren Wash Alluvial Fan. The part of the RWMS that is located within Zone AO of this

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APPENDIX A

HEC-1 MODEL OUTPUT



APPENDIX A HEC-1 MODEL OUTPUT

	100-YEA	R MODELS	
RWMS.OUT	RWMSCN.OUT	RWMSW.OUT	RWMSC.OUT
	10-YEAF	MODELS	
RWMS	10.OUT	RWMS1	IOC.OUT
	2-YEAF	MODEL	
	RWM	S2.OUT	

FLOOD HYDROGRAPH PACKAGE (HEC-1) SEPTEMBER 1990

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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

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FLOOD ASSESSMENT FOR RWMS JOB #:51056 FILE: RWMS.DAT
100-YEAR 6-HOUR STORM 1.6 INCHES
POINT RAINFALL VALUES FORM NOAA ATLAS 2 VOL VII
DEPTH-AREA REDUCTION FACTORS FROM TABLE 502 IN
CLARK COUNTY HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL (CCRFCD, 1990)
CURVE NUMBERS DETERMINED USING TABLE 602 IN CCRFCD, 1990
LAG TIMES DETERMINED USING METHOD IN SECTION 606.3 IN CCRFCD, 1990
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                                                                                 8.0
19.0
                                    18.0
                                                                                                19.7
29.0
36.1
                                                                                                              20.2
                                                                                                                                            22.0
                                                    18.2
                                                                   18.7
                                                                                                                             21.0
                                                                                                                                                           23.0
27
28
29
30
                                    25.0
32.1
                                                                                                                                            30.9
                        PC
PC
PC
PC
PC
PC
                                                   25.9
                                                                   26.5
                                                                                 28.0
                                                                                                              30.0
                                                                                                                             30.5
                                                                                                                                                           31.0
                                                                                 34.6
72.0
                                                                                                                             40.8
77.9
                                                                                                                                            43.0
79.0
                                                                                                                                                           47.7
79.5
                                                                  33.3
                                                   32.7
                                                                                                              38.1
                                                                  71.0
82.6
                                                    63.0
                                                                                                73.1
                                                                                                              75.2
88.9
                                    56.1
                                                                                                                                                                          80.4
                                    81.0
97.4
99.7
1.26
                                                   82.0
97.9
99.9
20
                                                                                 84.0
                                                                                                85.9
                                                                                                                             91.0
                                                                                                                                            93.8
                                                                                                                                                           96.6
99.3
                                                                                                                                                                         97.0
31
32
33
34
35
36
                                                                                 98.3
                                                                                                              98.9
                                                                  98.1
                                                                                                98.5
                                                                                                                             99.0
                                                                                                                                                                         99.6
                                                                 100.0
                                                       30
                         ĴĎ
                                    1.18
                                    1.09
                                                       50
                         JD
                                                     100
                                       .96
                         JD
                                    MM1A
37
                         KK
                                   Basin runoff calculation for Mass. Mountains 1A
38
                         KM
39
                         BA
                                        .9
40
                         LS
                         UD
                                       .31
                                      BŴ1
43
                         KM
                                      Basin runoff calculation for Barren Wash 1
44
                                    60.5
45
                         LS
                                                        83
                                      2.1
```

```
KK
KM
                          BW2
47
48
49
50
51
                          Basin runoff calculation for Barren Wash 2
                         20.8
                 BA
                 LS
                            .9
                 UD
52
53
54
                 KK
                        BW1&2
                        Combined BW1 and BW2
                 KM
HC
55
56
57
                 KK
                       BW APX
                 KM
                        Combine BW1, BW2, and MM1A (assume dischaarge of Barren Wash "active apex")
58
59
                  ΚK
                         MM1B
                      Basin runoff calulation for Mass. Mountains 1B
Flow was not combined with BW APX because flow from this watershed
will not directly impact RWMS wereas a channel migration at the apex
could impact the RWMS
2.1
                 KM
                 BA
LS
UD
60
61
62
                           .48
63
64
65
66
67
                  KK
                          MM2
                  KM
                         Basin runoff calculation for Mass. Mountains 2
                  BA
                           1.4
                  LS
                           .47
                  UD
 68
69
70
                          HP1A
                  ΚK
                  KM
                          Basin runoff calculation for Half Pint Range 1A
                 BA
                            .8
 71
72
                                      85
                  LS
                           .48
                 UD
 73
74
75
                  KK
                        RTCPA
                        Route Flow from HP1A to CPA
                  KM
                  RM
 76
77
78
79
80
                  KK
                 KM
BA
                          Basin runoff calculation for Half Pint Range 18
                           1.0
                                       78
                  LS
                           .51
                  UD
                  KK
KM
 81
                           HP2
 82
83
                          Basin runoff calculation for Half Pint Range 2
                  BA
                          1.2
 84
85
                 LS
                                       78
                           .51
 86
                  KK
                          CPA1
                          Combine MM2, routed HP1A, HP1B, HP2
 87
                  KM
HC
 88
 89
 90
91
92
93
                           (CPB) Basin runoff calculation for Half Pint Range 3 1.7
                  KM
                  BA
                  LS.
                                       82
                           .59
                  UD
 94
95
                          Combine HP3 with flow from CPA1
                  KM
 96
                  HC
 98
                  KM
                           (CPC) Basin runoff calculation for Half Pint Range 4
                           3.3
                  BA
100
                  LS
101
                  UD
                           .52
103
                           Basin runoff calculation for Half Pint Range 5
104
                  BA
                           1.2
105
                  LS
106
                  UD
                            .3
107
108
                  KM
                           Basin runoff calculation for Half Pint Range 6
109
                  BA
                           2.2
110
                  ĹS
                                       80
111
                  ŪD
                           .55
112
                  KK
                        RTCPD
113
                          Route HP6 to CPD 5 .27
                  KM
                  RM
                                                  .2
```

```
KK
KM
BA
LS
UD
                             HPFA
Basin runoff calculation for Half Pint Range FA
.3
                               .33
                    KK
KM
HC
                               CPD
Combine HP5, routed HP6, and HPFA
3
123
124
125
                            RTCPE Route flow from CPD to CPE 8 .39 .2
126
127
128
129
130
                     KK
KM
BA
LS
UD
                               Rasin runoff calculation for Half Pint Range FB 1.6
                               .44
131
132
133
                     KK
KM
HC
                              CPE Combine HP4 (CPC) with routed flow from CPD, and HPFB \bf 3
                              Combine all flow at Concentration just below RWMS (Flow from CPA & CPE) 2
                    KK SC1
KM Basin runoff calculation for Scarp Canyon 1
* Concentration Pt of this watershed is the active apex of the Scarp Canyon Fan
BA 39.4
LS 82
UD 2.1
137
138
139
140
141
                               SC2
Basin runoff calculation for Scarp Canyon 2
1.5
                     KK
KM
BA
LS
UD
ZZ
                                .48
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	(V) RO	CHEMATIC DIAG UT,ING		VERSION OR F	PUMP FLOW		
, NO.	(.) CO	NNECTOR	(<) RE	TURN OF DIVE	RTED OR PUMP	ED FLOW	
37	мм1а	Maria de					
42		BW1					
47	. •	•	BW2	!			
52		BW1&2.	· · · · · · · · · · · · · · · · · · ·				
55	BW APX						•
58		мм1в	· · · · · · · · · · · · · · · · · · ·	•			
63	•	•	мма	!		٠.	
68	•		•	. HP1A			
73	•	•		RTCPA	•		
76	•	· •		•	HP1B		
81	•			•	•	HP2	
86	·		CPA		•	•	
89	•	•	•	HP3	;		
94	` ·	•	CPA			•	
97				. НР4			
102			•).	. HP5	`	
107		•			•	HP6	
- 112					•	V V RTCPD	•
115			•		•	•	HPFA
120			•		CPD	•	•
123			•	•	V RTCPE		
126			•		•	HPFB	
131				CPE	•	•	
134	,		CPI	•			
137		•	•	. sc1			
142		•		•	sc2		
(***)	RUNOFF ALSO	COMPUTED AT	THIS LOCATI	I ON	· ,		

RUN DATE 01/29/1993 TIME 21:56:35

U.S. ARMY CORPS OF ENGINEERS HYDROLOGIC ENGINEERING CENTER 609 SECOND STREET DAVIS, CALIFORNIA 95616 (916) 756-1104

FLOOD ASSESSMENT FOR RWMS JOB #:51056 FILE: RWMS.DAT
100-YEAR 6-HOUR STORM 1.6 INCHES
POINT RAINFALL VALUES FORM NOAA ATLAS 2 VOL VII
DEPTH-AREA REDUCTION FACTORS FROM TABLE 502 IN
CLARK COUNTY HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL (CCRFCD, 1990)
CURVE NUMBERS DETERMINED USING TABLE 602 IN CCRFCD, 1990
LAG TIMES DETERMINED USING METHOD IN SECTION 606.3 IN CCRFCD, 1990
DRAINAGE AREAS FROM 7.5 MINUTE AND 15 MINUTE QUADS
THIS MODEL ADDRESSES DRAINAGES THAT COULD IMPACT THE RWMS

11 10	IPLOT 0	PRINT CONTROL PLOT CONTROL	CALE					
IT	QSCAL O. HYDROGRAPH TIME DATA NMIN 3	MINUTES IN COMPUT		/AL				* **
	IDATE 1 0 ITIME 0000 ND N	STARTING TIME NUMBER OF HYDROGR ENDING DATE ENDING TIME	APH ORDINATE	:s				
	COMPUTATION INTERVAL TOTAL TIME BASE	.05 HOURS 14.95 HOURS		`				
	PRECIPITATION DEPTH INC LENGTH, ELEVATION FEE FLOW CUE STORAGE VOLUME ACR SURFACE AREA ACR	IC FEET PER SECOND						
13 JD	INDEX STORM NO. 1 STRM 1.60 TRDA .01							
14 PI	.54 .54 .54 .52 .32 .30 .48 .1.62 1.68 .2.04 2.10 .30 .28 .96 .86 .18 .16 .06 .06	2.22 1.26 .00 .00 .42 .22 .54 .46 .60 .80 .84 .60 1.80 2.88 2.22 1.98 .24 .40 .66 .74 .12 .12	.78 .00 .12 .42 .90 .48 3.42 1.86 .48 .78 .12	1.02 .00 .36 .12 .72 .18 5.40 .42 .48 1.20	1.10 .00 .44 .10 .64 .16 5.42 .60 .56 .92 .10	1.26 .00 .60 .06 .48 .12 5.46 .96 .72 .36 .18	1.06 .00 .76 .06 .24 .52 6.62 .96 1.12 .36 .06	.96 .00 .84 .06 .12 .72 7.20 .96 1.32 .36 .00
22 JU	INDEX STORM NO. 2 STRM 1.55 TRDA 1.00						-	
0 P1	PRECIPITATION PATTERN 1.20 1.54 .36 .24 .18 .26 .54 .54 .18 .32 .30 .48 1.62 1.68 2.04 2.10 .30 .28 .96 .86 .18 .16 .06 .06	2.22 1.26 .00 .00 .42 .22 .54 .46 .60 .80 .84 .60 1.80 2.88 2.22 1.98 .24 .40 .66 .74 .12 .12	.78 .00 .12 .42 .90 .48 3.42 1.86 .48 .78 .12	1.02 .00 .36 .12 .72 .18 5.40 .42 .48 1.20	1.10 .00 .44 .10 .64 .16 5.42 .60 .56 .92	1.26 .00 .60 .06 .48 .12 5.46 .96 .72 .36	1.06 .00 .76 .06 .24 .52 6.62 .96 1.12 .36 .06	.96 .00 .84 .06 .12 .72 7.20 .96 1.32 .36

ا قد خد				•				-
23 JO	INDEX STORM NO. 3 STRM 1.38 TRDA 9.99	PRECIPITATION DEI	PTH AINAGE AREA	•.	•			
0 P1	PRECIPITATION PATTERN 1.20 1.54 .36 .24 .18 .26 .54 .54 .18 .32 .30 .48 1.62 1.68 2.04 2.10 .30 .28 .96 .86 .18 .16 .06 .06	2.22 1.26 .00 .00 .42 .22 .54 .46 .60 .80 .84 .60 1.80 2.88 2.22 1.98 .24 .40 .66 .74 .12 .12	.78 .00 .12 .42 .90 .48 3.42 1.86 .48 .78 .12	1.02 .00 .36 .12 .72 .18 5.40 .42 .48 1.20 .06	1.10 .00 .44 .10 .64 .16 5.42 .60 .56 .92 .10	1.26 .00 .60 .06 .48 .12 5.46 .96 .72 .36 .18	1.06 .00 .76 .06 .24 .52 6.62 .96 1.12 .36 .06	.96 .00 .84 .06 .12 .72 7.20 .96 1.32 .36 .00
24 JD	INDEX STORM NO. 4 STRM 1.38 TRDA 10.01	PRECIPITATION DE TRANSPOSITION DR					•	• •
25 PI	PRECIPITATION PATTERN 1.20 1.58 .60 .56 .18 .26 .66 .62 .60 .50 .36 .36 1.32 1.82 .60 .62 .54 .48 1.80 1.62 .30 .24 .12 .10	2.34 1.62 .48 .28 .42 .34 .54 .54 .30 .26 .36 .64 2.82 2.42 .66 1.06 .36 .52 1.26 1.54 .12 .12	1.26 .18 .30 .54 .78 2.22 1.26 .60 1.68 .12 .18	1.80 .54 .48 .36 .90 2.82 1.62 .36 1.68 .12	1.88 .40 .52 .54 .18 1.00 3.26 1.30 .52 1.20 .16	2.04 .12 .60 .90 .42 1.20 4.14 .66 .84 .24 .24	.92 .24 .60 .70 .30 1.48 4.58 .42 1.04 .24	.36 .30 .60 .60 .24 1.62 4.80 .30 1.14 .24 .06
33 JD	INDEX STORM NO. 5 STRM 1.26 TRDA 20.00	PRECIPITATION DE TRANSPOSITION DR	PTH AINAGE AREA				·	
O PI	PRECIPITATION PATTERN 1.20 1.58 .60 .56 .18 .26 .66 .62 .60 .50 .36 .36 1.32 1.82 .60 .62 .54 .48 1.80 1.62 .30 .24 .12 .10	2.34 1.62 .48 .28 .42 .34 .54 .54 .30 .26 .36 .64 2.82 2.42 .66 1.06 .36 .52 1.26 1.54 .12 .12 .06 .14	1.26 .18 .30 .54 .24 .78 2.22 1.26 .60 1.68 .12 .18	1.80 .54 .48 .36 .90 2.82 1.62 .36 1.68 .12	1.88 .40 .52 .54 .18 1.00 3.26 1.30 .52 1.20 .16	2.04 .12 .60 .90 .42 1.20 4.14 .66 .84 .24 .24	.92 .24 .60 .70 .30 1.48 4.58 .42 1.04 .24	.36 .30 .60 .60 .24 1.62 4.80 .30 1.14 .24
34 JD	INDEX STORM NO. 6 STRM 1.18 TRDA 30.00	PRECIPITATION DE TRANSPOSITION DR	PTH AINAGE AREA					
O PI	.18 .26	2.34 1.62 .48 .28 .42 .34 .54 .54 .30 .26 .36 .64 2.82 2.42 .66 1.06	.24 .78 2.22	.48 .36 .06 .90 2.82	1.88 .40 .52 .54 .18 1.00 3.26 1.30 .16 .08	24	.92 .24 .60 .70 .30 1.48 4.58 .42 1.04 .24	.36 .30 .60 .60 .24 1.62 4.80 .30 1.14 .24 .06
35 JD	INDEX STORM NO. 7 STRM 1.09 TRDA 50.00	PRECIPITATION DE TRANSPOSITION DR	PTH AINAGE AREA		• .			· .
0 PI	.18 .26 .66 .62 .60 .50	2.34 1.62 .48 .28 .42 .34 .54 .54 .30 .26 .36 .64 2.82 2.42 .66 1.06 .36 .52 1.26 1.54 .12 .12	1.26 .18 .30 .54 .24 .78 2.22 1.26 .60 1.68 .12	.06	1.88 .40 .52 .54 .18 1.00 3.26 1.30 .52 1.20 .16	2.04 .12 .60 .90 .42 1.20 4.14 .66 .84 .24 .24	.92 .24 .60 .70 .30 1.48 4.58 .42 1.04 .24	.36 .30 .60 .60 .24 1.62 4.80 .30 1.14 .24

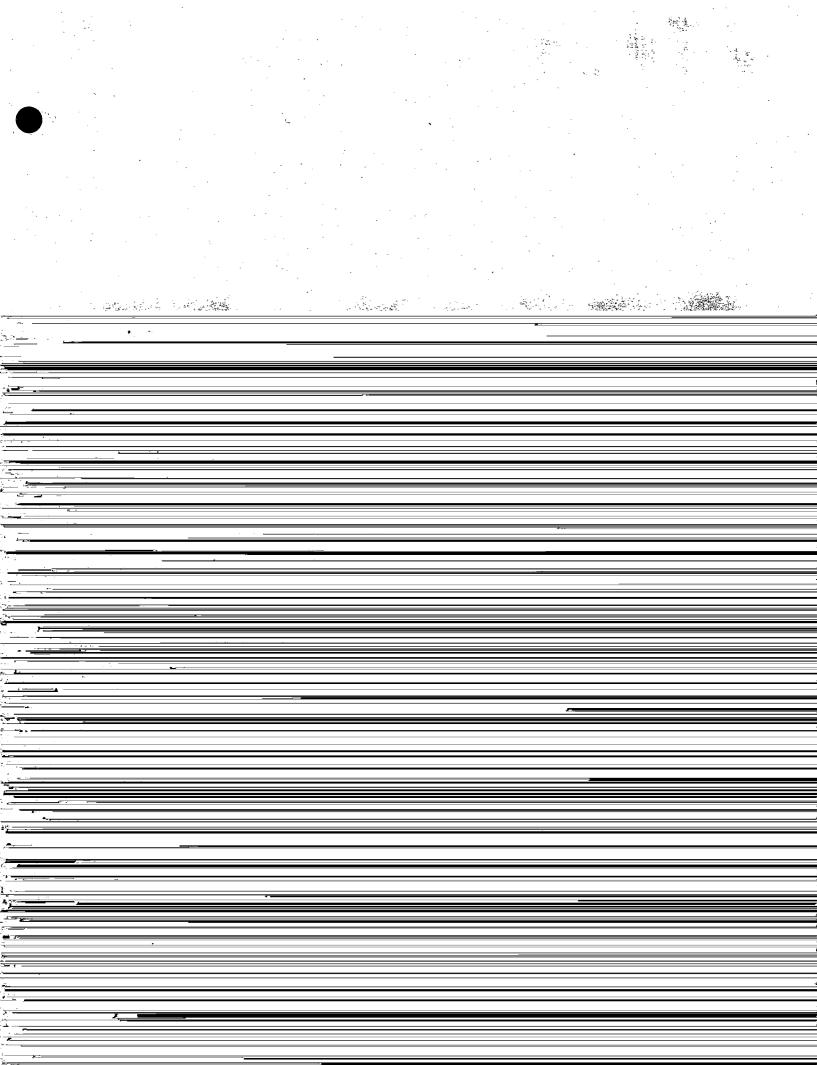
 \sim

36 JD		INDEX STORM	NO. 8							•	
		STRM	.96	PRECIPI	TATION DEP	TH		,			,
		TRDA	100.00	TRANSPO	SITION DRA	INAGE AREA	•			•	•
0 PI			ION PATTERN					•			
		1.20	1.58	2.34	1.62	1.26	1.80	1.88	2.04	`.92	.36
		.60	.56	.48	.28	.18	.54	40	.12	.24	.30
	•	.18	.26	.42	.34	.30	.48	.52	.60	.60	.60
		.66	.62	.54	.54	.54	.36	.54	.90	.70	.60
		.60	.50	.30	.26	.24	.06	.18	.42	.30	24
•	, ,	.36	.36	.36	.64	.78	.90	1,00	1.20	1.48	1.62
		1.32	1.82	2.82	2.42	2.22	2.82	3.26	4.14	4.58	4.80
	<i>.</i>	.60	.62	.66	1.06	1.26	1.62	1.30	.66	.42	.30
·	*	54	.48	.36	.52	.60	.36	.52	.84	1.04	1 16
		1.80	1.62	1.26	1.54	1.68	1.68	1.20	.24	.24	.24
		30	.24	12	12	12	1.00	.16	.24	12	.06
		.12	.10	.06	14	.18	.06	.08	. 12	.08	.06

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FI	OW FOR MAXIM	JM PERTOD	BASIN	MAXIMUM	TIME OF
•	OPERATION	SIMITON	FLOW	PEAK	6-HOUR	24-HOUR	72-HOUR	AREA	STAGE	MAX STAGE
•	HYDROGRAPH AT	MM1A	174.	3.80	30.	12.	12.	.90		
+	HYDROGRAPH AT	BW1	1786.	6.35	961.	405.	405.	60.50		•
•	HYDROGRAPH AT	BW2	1016.	5.40	389.	156.	156.	20.80		
•	2 COMBINED AT	BW1&2	1848.	5.95	1003.	421.	421.	81.30		
•	2 COMBINED AT	BW APX	1841.	5.95	1004.	421.	421.	82.20		
+	HYDROGRAPH AT	MM1B	200.	4.05	47.	19.	19.	2.10		
+	HYDROGRAPH AT	MM2	184.	4.00	41.	16.	16.	1.40		:
•	HYDROGRAPH AT	нрта	200.	3.95	42.	17.	17.	.80		

· ·								
•	HYDROGRAPH AT	HP1B	116.	4.05	27.	11.	11.	1.00
•	HYDROGRAPH AT	HP2	136.	4.05	32.	13.	13.	1.20
• 4 · 6	4 COMBINED AT	CPA1	459.	4.15	120.	48.	48.	4.40
•	HYDROGRAPH AT	нр3	263.	4.10	64.	26.	26.	1.70
•	2 COMBINED AT	CPA2	659.	4.15	170.	68.	68.	6.10
• ·	HYDROGRAPH AT	HP4	360.	4.05	86.	35.	35.	3.30
+	HYDROGRAPH AT	HP5	206.	3.80	36.	14.	14.	1.20
•	HYDROGRAPH AT	HP6	277.	4.10	67.	27.	27.	2.20
• • • • • • • • • • • • • • • • • • •	ROUTED TO	RTCPD	268.	4.35	67.	27.	27.	2.20
, , , , , , , , , , , , , , , , , , ,	HYDROGRAPH AT	HPFA	41.	3.85	8.	3.	3.	.30
•	3 COMBINED AT	CPD	333.	4.25	99.	40.	40.	3.70
•	ROUTED TO	RTCPE	326.	4.65	99.	40.	40.	3.70
+	HYDROGRAPH AT	НРЕВ	167.	4.00	37.	15.	15.	1.60
+	3 COMBINED AT	CPE	603.		191.	77.	77.	8.60
+	2 COMBINED AT	CPF	878.	5.15	301.	121.	121.	14.70
,	HYDROGRAPH AT		, 0, 0,	, , ,	J01•	161.	121.	14.70



FLOOD HYDROGRAPH PACKAGE (HEC-1) SEPTEMBER 1990 VERSION 4.0

RUN DATE 01/29/1993 TIME 21:59:18 *

U.S. ARMY CORPS OF ENGINEERS
HYDROLOGIC ENGINEERING CENTER
609 SECOND STREET
DAVIS, CALIFORNIA 95616
(916) 756-1104

X.	X	XXXXXXX	XX	XXX		X
Χ.	Х	X	X	X	2.3	XX
Χ.	X	X	Χ.		<i>-</i>	[}] X
XXXX	XXX	XXXX	Х		XXXXX	. Х
Χ.	X	X	X			X
Х	X	X	Х	Х		X
Х	X	XXXXXXX	XX	XXX		XXX

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1				- 10	ELOON	ACCECCHE	NT FOR RWI	MC 100	#·51054	5	ILE: RWM	CCH DAT		
					1000	ASSESSIE	NI FOR KWI	1 200	6.21020		ICC. KWM	SCR.UAI		
2				10	100-15	AR 6-HOU	R STORM 1	.6 INCHI	ES			*	,	
3				10	POINT	RAINFALL	VALUES F	rom Noaj	A ATLAS Z	NOF All		•		A
4				10	DEPTH-	AREA REDI	UCTION FA	CTORS FI	ROM TABLE	502 IN				
5				io			YDROLOGIC				ESTON NO	DEL CCCD	ECD 100	n)
,		*			CLARK	COOKITER	IDROLOGIC	CKITER	14 AND UN	AIRAGE D	COLON WO	DEL (CCK	LCD, 133	0)
6				10	CURVE	NUMBERS	DETERMINE	DUSING	IARLE 90	JZ IN CCR	FCD, 199	0	•	•
. 7				10	LAG TI	MES DETE	RMINED US	ING MET	HOD IN SE	CTION 60	6.3 IN C	CRFCD. 1	990	
8				10	DRAINA	GF AREAS	FROM 7.5	MINUTE	AND 15 N	LINUITE OU	ADS			
9				10			RESSES DR					мс		
		- 1												
10				10) ADJUST	ED CURVE	NUMBERS	8Y 5 TO	ACCOUNT	FOR MOIS	TER SOIL	S DURING	THE 100	-YR EV
				*0	IAGRAM									•
11	:			11		. 0	0	300						~
				_	-	•	•	500	•					
12				10							•	1		
13				IN	5									
14				JD	1.6	.01								
				. *	RAINFALL	DISTRIBU	TION FROM	CLARK	COUNTY MA	NUAL LES	S THAN 1	O SO. MI	LES	
15				PC		2	5.7	7.0	8.7	10.8	12.4	13.0	13.0	13.0
16				PC		13.0	13.0	13.3	14.0	14.2	14.8	15.8	17.2	18.1
17				PC	19.0	19.7	19.9	20.0	20.1	20.4	21.4	22.9	24.1	24.9
18				PC	25.1	25.6	27.0	27.8	28.1	28.3	29.5	32.2	35.2	40.9
19				PC		59.0	71.0	74.4	78.1	81.2	81.9	83.5	85.1	85.6
20														07.0
		٠.		PC		86.8	87.6	88.8	91.0	92.6	93.7	95.0	97.0	97.6
- 21				PC	98.2	98.5	98.7	98.9	99.0	99.3	99.3	99.4	99.5	99.8
22	٠.			. P(99.8	99.9	100.0		1.5					
23	,		4 1	JC		1		•	•		- · · · · .			
24				J[9.99								
				*	CHANGED R		DISTRIBUT	TON YRO	VE 10 SQ.	, MILES P	ER CLARK	COUNTY	MANUAL	
25				J	1.38	10.01								
26				P	. 0	2.0	5.9	8.0	11.0	14.4	15.0	16.0	16.8	17.1
27				PC		18.2	18.7	19.0	19.7		21.0	22.0	23.0	24.1
			*											
28				PC		25.9	26.5	28.0	29.0	30.0	30.5	30.9	31.0	31.7
29				PC			33.3	34.6	36.1	38.1	40.8	43.0	47.7	51.4
- 30				. P(56.1	63.0	71.0	72.0	73.1	75.2	77.9	79.0	79.5	80.4
31				PC		82.0	82.6	84.0	85,9	88.9	91.0	93.8	96.6	97.0
32				PC		97.9	98.1	98.3	98.5	98.9	99.0	99.2	99.3	
								70.3	70.3	90.9	99.0	99.2	77.3	99.6
33				P		99.9	100. 0							
34		-		JE	1.26	. 20			•					
. 35				JC	1.18	30								
36				JC		50				`				
							•							
37				J	.96	100								
38				KI	C MM1A		•	• •						
39			٠.	K		cupoff c	alculatio	n for H	acc Maiir	staine 1A				
						Turior 1 C	accutatio	11 -1 O1 FI	ass. Moul	ILOIIIS IM				
40				B/										
41				LS	S ·	85				•				
42				U	.31									
				٠.										
				10.								,		
43				, KI										
44				KI	4 Basi	in runoff	calculat	ion for	Barren W	lash 1				
45				B				,						
46				LS		88			•			•		
						.00								
47				U	2.1						,			

```
48
49
50
51
52
                KK
KM
BA
LS
UD
                         BW2
                         Basin runoff calculation for Barren Wash 2
                       20.8
                          .9
53
54
55
                KK
                      BW1&2
                KM
                      Combined BW1 and BW2
                HC
                KK
                      Combine BW1, BW2, and MM1A (assume dischaarge of Barren Wash "active apex")
                KM
58
                HC
59
                KK
                     Basin runoff calulation for Mass. Mountains 1B
flow was not combined with BW APX because flow from this watershed
60
                KM
                     will not directly impact RWMS wereas a channel migration at the apex could impact the RWMS
61
                BA
                         2.1
62
63
                LS
                UD
                         .48
64
65
66
67
                KK
                KM
                               runoff calculation for Mass. Mountains 2
                        Basin
                BA
                         1.4
                LS
68
                         .47
                UD
69
70
71
72
73
                 KK
                        HP1A
                 KM
                        Basin
                               runoff calculation for Half Pint Range 1A
                 ВА
                          .8
                 LS
                 UD
                         .48
74
75
76
                 KK
                      RTCPA
                      Route Flow from HP1A to CPA 9 .43 .2
                 KM
                 RM
77
78
79
80
                 KK
                        HP1B
                 KM
                        Basin runoff calculation for Half Pint Range 1B
                 BA
                         1.0
                 LS
81
                         .51
                 UD
82
83
                 ΚK
                         HP2
                 KM
                        Basin runoff calculation for Half Pint Range 2
84
85
                 ВА
                        1.2
                 LS
                                    83
 86
                 Ū
                         .51
 87
                 ΚK
                        CPA1
 88
                 KM
                        Combine MM2, routed HP1A, HP1B, HP2
 89
                 HC
 90
                 KK
 91
                 KM
                         (CPB) Basin runoff calculation for Half Pint Range 3
 92
93
                 BA
                         1.7
                 LS
 94
                 ŪĎ
                         .59
 95
                 KK
                        CPA2
 96
97
                 KM
                        Combine HP3 with flow from CPA1
                 HC
 98
                 KK
                         (CPC) Basin runoff calculation for Half Pint Range 4
 99
                 KM
100
                 BA
101
                 LS
                                    84
102
                 UD
                         .52
103
                 KK
104
                 KM
                         Basin runoff calculation for Half Pint Range 5
105
                 BA
                         1.2
106
                 LS
                          .3
107
                 UD
108
                 KK
                         HP6
109
                 KM
                         Basin runoff calculation for Half Pint Range 6
110
                 BA
                         2.2
111
                 LS
                                    85
112
                 UD
                         .55
113
114
115
                 KK
                       RTCPD
                        Route HP6 to CPD 5 .27
                 KM
                 RM
```

116 117	KK. KM	HPFA Basin runoff calculation for Half Pint Range FA
118	BA	3
119	LS	82
120	ÚĎ	.33
121	, KK	CPD
122	KM	Combine HP5, routed HP6, and HPFA
123	HC	
40/		DTOOP.
124	KK	RTCPE
125	KM	Route flow from CPD to CPE
126	RM	8 .39 .2
127	KK	HPFB
128	- KM	Basin runoff calculation for Half Pint Range FB
129	BA	1.6
130	LS	82
131	UD	.44
131		
132	KK	CPE
133	KM	Combine HP4 (CPC) with routed flow from CPD, and HPFB
134	HC	3
135	KK	CPF
136	KM	Combine all flow at Concentration just below RWMS (Flow from CPA & CPE)
137	HC	2
138	KK	SC1
139	KM * Co	Basin runoff calculation for Scarp Canyon 1 encentration Pt of this watershed is the active apex of the Scarp Canyon Fan
140	BA	39.4
141	LS	87
142	บ้อ	2.1
142		
143	KK	SC2
144	KM	Basin runoff calculation for Scarp Canyon 2
145	BA	1.5
146	LS	82
147	ŪĎ	.48
148	ZZ	

SCHEMATIC DIAGRAM OF STREAM NETWORK .

LINE	(V) ROUT	TING	(>) DI	ERSION OR P	UMP FLOW		
NO.	(.) CON	NECTOR	(<) RE	TURN OF DIVE	RTED OR PUMP	ED FLOW	٠.
38	MM1A				,		
43	•	BW1					
48			BW2		,		
				4			t
53		BW1&2.					
56	BW APX.						
	•				,		
59	•	MM1B	-				
64			` MM2		*		
		•	•				*
69	•	•	•	HP1A V			,
74	•	•	•	V RTCPA			•
	•	•	•				
77		•	•	•	HP18	•	
82			•			HP2	
	•	•	•	•	•	•	*
87			CPA1	• • • • • • • • • • • • • • • • • • • •		•••••	
90	•		•	HP3		,	
	•	•	•	•		* 1	
95		•	CPA2	•••••••••••••••••••••••••••••••••••••••			• ,
- 98		•	•	HP4			
	•	•	•	•			
103		•	•		HP5	•	
108	•	•		•		нр6	
	•	•		•		V	+
113	•					RTCPD	1.00
116	•	•	•	•		•	HPFA
	•	:	· · · · · · · · · · · · · · · · · · ·	•	200	•	•
121	:	•	•		CPC	! !	· · · · · · · · · · · · · · · · · · ·
124	•	•	•	•	RTCPE		
127		•	. •	•	. •	unco	
127		:	· •	•	. •	HPFB	•
132	•	•	. ,	CPE		•	
475	•;	•		•	ı	•	
135			CPF	• • • • • • • • • • •			
- 138	•	•	•	sc1			
. 4/7	•		•	, •			
143		•	•	•	SC2		

FLOOD HYDROGRAPH PACKAGE (HEC-1) SEPTEMBER 1990 VERSION 4.0

RUN DATE 01/29/1993 TIME 21:59:18

U.S. ARMY CORPS OF ENGINEERS HYDROLOGIC ENGINEERING CENTER 609 SECOND STREET DAVIS, CALIFORNIA 95616 (916) 756-1104

FLOOD ASSESSMENT FOR RWMS JOB #:51056 FILE: RWMSCN.DAT
100-YEAR 6-HOUR STORM 1.6 INCHES
POINT RAINFALL VALUES FROM NOAA ATLAS 2 VOL VII
DEPTH-AREA REDUCTION FACTORS FROM TABLE 502 IN
CLARK COUNTY HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MODEL (CCRFCD, 1990)
CURVE NUMBERS DETERMINED USING TABLE 602 IN CCRFCD, 1990
LAG TIMES DETERMINED USING METHOD IN SECTION 606.3 IN CCRFCD, 1990
DRAINAGE AREAS FROM 7.5 MINUTE AND 15 MINUTE QUADS
THIS MODEL ADDRESSES DRAINAGES THAT COULD IMPACT THE RWMS
ADJUSTED CURVE NUMBERS BY 5 TO ACCOUNT FOR MOISTER SOILS DURING THE 100-YR EV

PRINT CONTROL IPRNT PLOT CONTROL IPLOT 0 0. HYDROGRAPH PLOT SCALE **QSCAL** HYDROGRAPH TIME DATA 11 MINUTES IN COMPUTATION INTERVAL NMIN STARTING DATE STARTING TIME IDATE ŏ 0000 ITIME NUMBER OF HYDROGRAPH ORDINATES NO 300 ENDING DATE NDDATE 0 1457 ENDING TIME NOTIME 19 CENTURY MARK ICENT COMPUTATION INTERVAL .05 HOURS 14.95 HOURS TOTAL TIME BASE ENGLISH UNITS SQUARE MILES DRAINAGE AREA PRECIPITATION DEPTH INCHES LENGTH, ELEVATION FFFT CUBIC FEET PER SECOND FLOW ACRE-FEET STORAGE VOLUME SURFACE AREA ACRES TEMPERATURE DEGREES FAHRENHEIT INDEX STORM NO. 1 14 JD STRM 1.60 PRECIPITATION DEPTH .01 TRANSPOSITION DRAINAGE AREA TRDA 15 PI PRECIPITATION PATTERN 1.20 1.54 2.22 .78 1.10 1.26 1.02 1.26 1.06 .00 .00 .00 .00 .00 .00 .00 .00 .42 .18 .22 .12 .36 . 26 .60 .76 .84 .12 .54 .10 .06 .48 .12 .06 .06 .64 .18 .32 .60 .80 .90 .24 .12 .48 .84 .48 .30 .60 . 18 .72 5.46 .96 .72 .36 1.62 1.68 1.80 2.88 3.42 5.40 5.42 6.62 7.20 .60 2.10 1.86 2.04 2.22 1.98 .42 .96 .96 .48 .28 .24 48 .30 .40 1.12 1.32 .96 .86 .92 .66 1.20 .36 .36 .12 .12 .10 .18 .16 .12 .06 .18 .06 .06 .06 .00 .02 .06 .14 .06 . 06 .06 23 JD INDEX STORM NO. 2 STRM 1.55 PRECIPITATION DEPTH 1.00 TRANSPOSITION DRAINAGE AREA TRDA PRECIPITATION PATTERN
1.20 1.54
.36 .24 0 PI 2,22 1.26 1.02 1.10 1.06 1.26 .00 .00 .00 .00 .00 .00 .00 .00 .44 .18 .26 .42 .22 .12 .36 .60 .84 .06 .54 .12 .42 .06 .72 .60 .90 .18 .80 .24 .52 .64 .48 .12 .48 .30 .84 .48 .60 .16 .12 .72 1.68 1.80 2.88 3.42 5.40 5.46 5.42 1.62 7.20 6.62

24 JD	INDEX STORM NO. 3 STRM 1.38 TRDA 9.99	PRECIPITATION DEP	TH INAGE AREA					
0 PI	.54 .54 .18 .32 .30 .48 1.62 1.68 2.04 2.10	2.22 1.26 .00 .00 .42 .22 .54 .46 .60 .80 .84 .60 1.80 2.88 2.22 1.98 .24 .40 .66 .74 .12 .12	.00 .12 .42	.00 .36 .12	1.10 .00 .44 .10 .64 .16 5.42 .60 .56 .92 .10	1.26 .00 .60 .06 .48 .12 5.46 .96 .72 .36 .18	1.06 .00 .76 .06 .24 .52 6.62 .96 1.12 .36 .06	.96 .00 .84 .06 .12 .72 7.20 .96 1.32 .36 .00
25 JD	INDEX STORM NO. 4 STRM 1.38 TRDA 10.01	PRECIPITATION DEP	TH INAGE AREA	. ;				
26 PI	PRECIPITATION PATTERN 1.20 1.58 .60 .56 .18 .26 .66 .62 .50 .36 1.32 1.82 .60 .62 .54 .48 1.80 1.62 .30 .24 .12 .10	2.34 1.62 .48 .28 .42 .34 .54 .54 .30 .26 .36 .64 2.82 2.42 .66 1.06 .36 .52 1.26 1.54 .12 .12	1.26 .18 .30 .54 .24 .78 2.22 1.26 .60 1.68 .12	1.80 .54 .48 .36 .90 2.82 1.62 .36 1.68 .12	1.88 .40 .52 .54 .18 1.00 3.26 1.30 .52 1.20	2.04 .12 .60 .90 .42 1.20 4.14 .66 .84 .24 .24	.92 .24 .60 .70 .30 1.48 4.58 .42 1.04 .24 .12	.36 .30 .60 .60 .24 1.62 4.80 .30 1.14 .24 .06
34 JD	INDEX STORM NO. 5 STRM 1.26	PRECIPITATION DEP	TH					
O PI	PRECIPITATION PATTERN 1.20 1.58 .60 .56 .18 .26 .66 .62 .60 .50 .36 .36 1.32 1.82 .60 .62 .54 .48 1.80 1.62 .30 .24 .12 .10	2.34 1.62 .48 .28 .42 .34 .54 .54 .30 .26 .36 .64 2.82 2.42 .66 1.06 .36 .52 1.26 1.54 .12 .12	1.26 .18 .30 .54 .24 .78 2.22 1.26 .60 1.68 .12 .18	.36 .06 .90 2.82 1.62 .36 1.68	1.88 .40 .52 .54 .18 1.00 3.26 1.30 .52 1.20 .16	2.04 .12 .60 .90 .42 1.20 4.14 .66 .84 .24 .24	.92 .24 .60 .70 .30 1.48 4.58 .42 1.04 .24 .12	.36 .30 .60 .60 .24 1.62 4.80 .30 1.14 .24
35 JD	INDEX STORM NO. 6 STRM 1.18 TRDA 30.00	PRECIPITATION DEP	TH INAGE AREA				• •	
0 PI	.54 .48 1.80 1.62	.54 .54 .30 .26 .36 .64 2.82 2.42	.54 .24 .78 2.22 1.26	.48 .36 .06 .90 2.82 1.62 .36	.18 1.00 3.26 1.30 .52	2.04 .12 .60 .90 .42 1.20 4.14 .66 .84 .24 .24	.92 .24 .60 .70 .30 1.48 4.58 .42 1.04 .12	.36 .30 .60 .60 .24 1.62 4.80 .30 1.14 .24 .06
36 JD	INDEX STORM NO. 7 STRM 1.09 TRDA 50.00	PRECIPITATION DEP	TH INAGE AREA	•	*			
0 PI	1.32 1.82	2.34 1.62 .48 .28	.30 .54 .24 .78 2.22 1.26 .60	1.80 .54 .48 .36 .90 2.82 1.62 .36 1.68 .12	.18 1.00	.66	.92 .24 .60 .70 .30 1.48 4.58 .42 1.04 .24 .12	.36 .30 .60 .24 1.62 4.80 .30 1.14 .24 .06

37 JU	STRM STRM TRDA	.96		TATION DEP						:
0 PI	PRECIPITA			,						
	1.20	158	2.34	1.62	1.26	1.80	1.88	2.04	.92	. 36
	.60	56	.48	.28	.18	.54	∵ .40	.12	.24	.30
	.18	.26	.42	.34	.30	.48	.52	.60	.60	.60
	.66	.62	.54	.54	.54	.36	.54	.90	.70	.60
	.60	.50	.30	.26	. 24	.06	.18	.42	.30	.24
	.36	.36	.36	.64	.78	.90	1.00	1.20	1.48	1.62
	1.32	1.82	2.82	2.42	2.22	2.82	3.26	4.14	4.58	4.80
	.60	.62	.66	1.06	1.26	1.62	1.30	.66	.42	.30
	.54	48	.36	.52	.60	.36	.52	.84	1.04	1.14
	1.80	1.62	1.26	1.54	1.68	1.68	1.20	.24	.24	.24
	.30	.24	12	. 12	12	. 12	.16	.24	. 12	.06
	.12	.10	.06	.14	. 18	.06	.08	.12	.08	.06

RUNOFF SUMMARY FLOW IN CUBIC FEET PER SECOND TIME IN HOURS, AREA IN SQUARE MILES

•	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FL 6-HOUR	OW FOR MAXIM	UM PERIOD 72-HOUR	BASIN AREA	MAXIMUM STAGE
•	HYDROGRAPH	AT MM1A	284.	3.75	47.	19.	19.	.90	,
+	HYDROGRAPH	AT BW1	3190.	6.15	1762.	745.	745.	60.50	
•	HYDROGRAPH	AT BW2	1645.	4.40	678.	273.	273.	20.80	
•	2 COMBINED	AT BW1&2	3513.	5.75	1943.	817.	817.	81.30	
•	2 COMBINED	AT BW APX	3506.	5.75	1948.	819.	819.	82.20	
•	HYDROGRAPH	AT MM1B	361.	4.00	78.	31.	31.	2.10	
+ ,	HYDROGRAPH	AT MM2	311.	3.95	65.	26.	26.	1.40	
•	HYDROGRAPH	AT HP1A	300.	3.95	62.	25.	25.	.80	
• •	ROUTED TO	RTCPA	284.	4.35	62.	25.	25.	.80	
•	HYDROGRAPH	AT HP1B	200.	4.00	44.	18.	18.	1.00	
+	HYDROGRAPH	AT HP2	235.	4.00	52.	21.	21.	1.20	
+ .	4 COMBINED	AT CPA1	786.	4.10	194.	78.	78.	4.40	
+ .	HYDROGRAPH	AT HP3	420.	4.10	99.	40.	40.	1.70	
• •	2 COMBINED	AT CPA2	1126.	4.10	274.	110.	110.	6.10	
•	HYDROGRAPH	HP4	626.	4.00	139.	56.	56.	3.30	
. +	HYDROGRAPH	HP5	345.	3.75	56.	23.	23.	.1.20	
+ .	HYDROGRAPH	AT HP6	465.	4.05	106.	42.	42.	2.20	
•	ROUTED TO	RTCPD	449.	4.30	106.	42.	42.	2.20	
+	HYDROGRAPH	HPFA	71.	3.80	12.	5.	5.	.30	
+	3 COMBINED	CPD	570.	4.20	161.	64.	64.	3.70	
•	ROUTED TO	RTCPE	558.	4.55	161.	64.	64.	3.70	
•	HYDROGRAPH	HPFB	299.	3.95	61.	25.	· 25.	1.60	•
•	3 COMBINED	CPE	1108.	4.15	319.	128.	128.	8.60	
.	2 COMBINED	CPF	1462.	4.10	513.	206.	206.	14.70	
•	HYDROGRAPH	sc1	2178.	6.15	1201.	508.	508.	39.40	
•	HYDROGRAPH	SC2	269.	4.00	58.	23.	23.	1.50	

HEC-1 MODEL OUTPUT

FILENAME: RWMSW.OUT

(100-YEAR MODEL)

FLOOD HYDROGRAPH PACKAGE (HEC-1). SEPTEMBER 1990 VERSION 4.0

RUN DATE 01/29/1993 TIME 22:01:21

1

U.S. ARMY CORPS OF ENGINEERS HYDROLOGIC ENGINEERING CENTER 609 SECOND STREET DAVIS, CALIFORNIA 95616 (916) 756-1104

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X
          XXXXXXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

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FLOOD ASSESSMENT FOR RWMS JOB #:51056 F
100-YEAR 6-HOUR STORM 1.6 INCHES
POINT RAINFALL VALUES FROM NOAA ATLAS 2 VOL VII
DEPTH-AREA REDUCTION FACTORS FROM TABLE 502 IN
                                                                                                                                                                          FILE: RWMSW.DAT
                                  ID
  1
2
3
                                   ID
                                   ın
  45
                                   10
                                               CLARK COUNTY HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MAUAL (CCRFCD, 1990)
CURVE NUMBER DETERMINED USING TABLE 602 IN CCRFCD, 1990
LAG TIMES DETERMINED USING METHOD IN SECTION 606.3 IN CCRFCD, 1990
DRAINAGE AREAS FROM 7.5 MINUTE AND 15 MINUTE QUADS
THIS MODEL ADDRESSES DRAINAGES THAT COULD IMPACT THE RUMS
DIVISION OF THE NUMBERS BY 10. TO ACCOUNT FOR MOLETTE SOLES DUBLING THE 100.
                                   10
  6
                                   ID
                                   ID
  8
                                   ID
                                   1D
                                                ADJUSTED CURVE NUMBERS BY 10 TO ACCOUNT FOR MOISTER SOILS DURING THE 100-YR E
10
                                   ID
                                   *DIAGRAM
11
                                                                               0
                                                                                                                   300
                                   11
12
13
                                   10
                                   IN
                                 TO JD 1.6 .01

* RAINFALL DISTRIBUTION FROM CLARK COUNTY MANUAL LESS THAN PC 0 2 5.7 7.0 8.7 10.8 12.4 PC 13.0 13.0 13.0 13.3 14.0 14.2 14.8 PC 19.0 19.7 19.9 20.0 20.1 20.4 21.4 PC 25.1 25.6 27.0 27.8 28.1 28.3 29.5 PC 49.9 59.0 71.0 74.4 78.1 81.2 81.9 PC 86.0 86.8 87.6 88.8 91.0 92.6 93.7 PC 86.0 86.8 87.6 88.8 91.0 92.6 93.7 98.9 99.0 99.3 99.3
14
                                                                                                                                                                                              10 SQ. MILES
15
                                                                                                                                                                                                                            13.0
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22.9
32.2
83.5
95.0
16
                                                                                                                                                                                                                            17.2
                                                                                                                                                                                                                                                 18.1
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35.2
17
18
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85.6
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                                  PC
PC
PC
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                                    JD
                                                   1.55
                                   JD 1.50
* CHANGED RA
                                                                        9.99
                                                                    INFALL DISTRIBUTION ABOVE 10 SQ. MILES PER CLARK COUNTY MANUAL
25
26
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                                                                     10.01
                                                   1.38
                                                                                                                                                           14.4
20.2
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75.2
88.9
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21.0
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91.0
                                                                                                                                                                                                                           16.8
23.0
31.0
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79.5
96.6
99.3
                                                                                                                                                                                                                                                17.1
24.1
31.7
51.4
80.4
                                                          ō
                                                                                                                                                                                                      16.0
22.0
30.9
                                                                                                                   8.0
                                                                                                                                      11.0
                                                  18.0
25.0
32.1
56.1
81.0
97.4
99.7
1.26
                                                                                            18.7
                                                                                                                                      19.7
                                   PC
PC
PC
PC
PC
                                                                        18.2
                                                                                                                  19.0
                                                                       25.9
32.7
63.0
82.0
97.9
                                                                                            26.5
33.3
71.0
82.6
98.1
                                                                                                                                     29.0
36.1
73.1
85.9
                                                                                                                  28.0
                                                                                                                                                                                                      43.0
79.0
93.8
99.2
                                                                                                                 34.6
72.0
                                                                                                                                                                                                                                                 97.0
                                                                                                                 84.0
98.3
                                                                                                                                      98.5
                                                                                                                                                            98.9
                                                                        99.9
                                                                                          100.0
                                    JD
                                                                             20
                                    JD
                                                   1.18
                                                                             30
                                                   1,09
                                    JU.
```

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38
39
              KK
                     MM1A
               KM
                    Basin runoff calculation for Mass. Mountains 1A
40
              BA
                        .9
41
               LS
42
               UD
                       .31
43
44
45
               KM
                      Basin runoff calculation for Barren Wash 1
              BA
                     60.5
46
               LS
                                 93
               UD
                      2,1
```

```
KK
                       BMS
48
49
50
51
52
                        Basin runoff calculation for Barren Wash 2
               KM
                      20.8
               BA
               LS
                         .9
               W
53
               KK.
                     BW1&2
54
55
                     Combined BW1 and BW2
               KM
               HC
56
57
                     Combine BW1, BW2, and MM1A (assume dischaarge of Barren Wash "active apex")
               HC
58
59
               KK
                    Basin runoff calulation for Mass. Mountains 1B
Flow was not combined with BW APX because flow from this watershed
                    will not directly impact RWMS wereas a channel migration at the apex
                    could impact the RWMS
               ВА
                        2.1
62
63
               LS
               UD
                        .48
64
65
               KK
                        MM2
               KM
                              runoff calculation for Mass. Mountains 2
66
67
               ₿A
               LS
                                   89
68
               UD
                        .47
69
               KK
                       HP1A
70
               KM
                       Basin runoff calculation for Half Pint Range 1A
71
72
73
               BA
                        . .8
               UD
                        .48
74
                      RTCPA
75
76
                     Route Flow from HP1A to CPA
               RM
78
79
               KM
                       Basin
                              runoff calculation for Half Pint Range 18
               BA
                        1.0
 80
                LS
 81
               UD
                        .51
82
83
84
85
86
                       Basin runoff calculation for Half Pint Range 2
                ВА
                       1.2
                UD
                        .51
 87
                       CPA1
 88
                       Combine MM2, routed HP1A, HP1B, HP2
 89
                HC
 90
91
92
93
94
                        (CPB) Basin runoff calculation for Half Pint Range 3
                BA
                LS
                                  92 1
                UD
                       .59
95
96
97
                KK
                KM
HC
                       Combine HP3 with flow from CPA1
98
99
                KK
                KM
                        (CPC) Basin runoff calculation for Half Pint Range 4
100
                ВА
                        3.3
                                   89
101
                LS
                        .52
102
                UD
103
                        HP5
                KK
104
105
                        Basin runoff calculation for Half Pint Range 5
                KM
                ВА
                        1.2
106
                LS
                                  89
107
                         .3
                UD
108
                KK
                        HP6
109
                KM
                        Basin runoff calculation for Half Pint Range 6
                BA
LS
110
                        2.2
111
                                   90
112
                UD
                        .55
113
                      RTCPO
                       Route HP6 to CPD
114
                KM
115
```

117 118 119 120	KM BA LS UD	Basin runoff calculation for Half Pint Range FA .3 87 .33
121 122 123	KK KM HC	CPD Combine HP5, routed HP6, and HPFA 3
124 125 126	KK KM RM	RTCPE Route flow from CPD to CPE 8 .39 .2
127 128 129 130 131	KK KM BA LS UD	HPFB Basin runoff calculation for Half Pint Range FB 1.6 87 .44
132 133 134	KK KM HC	CPE Combine HP4 (CPC) with routed flow from CPD, and HPFB 3
135 136 137	KK KM HC	CPF Combine all flow at Concentration just below RWMS (Flow from CPA & CPE) 2
138 139 140	BA	SC1 Basin runoff calculation for Scarp Canyon 1 ncentration Pt of this watershed is the active apex of the Scarp Canyon Fan 39.4
141 142	LS UD	2.1
143 144 145 146 147 148	KK KM BA LS UD ZZ	SC2 Basin runoff calculation for Scarp Canyon 2 1.5 87 .48

SCHEMATIC DIAGRAM OF STREAM NETWORK

	SCHEMATIC DIAGRA	AM OF STREAM NETWORK
LINE	(V) ROUTING	(>) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<) RETURN OF DIVERTED OR PUMPED FLOW
38	MM1A	
, 43	. Bw1	
48		BW2
53	BW1&2	
56	BW APX	
59	. MM1B	
		MAD .
64		MM2
69		. HP1A V V
74		RTCPA
77	:	HP1B
82		
87		CPA1
90	•	. HP3
95		. : CPA2
98		. нр4
103	:	. нр5
108		HP6 V
113		RTCPD
116		HPFA
121		СРО
124	•	RTCPE
127	•	HPFB
	•	
132		. CPE
135		CPF
138		sc1
143	•	: sc2

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

FLOOD HYDROGRAPH PACKAGE (HEC-1) SEPTEMBER 1990 VERSION 4.0

RUN DATE 01/29/1993 TIME 22:01:21

U.S. ARMY CORPS OF ENGINEERS HYDROLOGIC ENGINEERING CENTER 609 SECOND STREET DAVIS, CALIFORNIA 95616 (916) 756-1104

FLOOD ASSESSMENT FOR RWMS JOB #:51056 FILE: RWMSW.DAT
100-YEAR 6-HOUR STORM 1.6 INCHES
POINT RAINFALL VALUES FROM NOAA ATLAS 2 VOL VII
DEPTH-AREA REDUCTION FACTORS FROM TABLE 502 IN
CLARK COUNTY HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MAUAL (CCRFCD, 1990)
CURVE NUMBER DETERMINED USING TABLE 602 IN CCRFCD, 1990
LAG TIMES DETERMINED USING METHOD IN SECTION 606.3 IN CCRFCD, 1990
DRAINAGE AREAS FROM 7.5 MINUTE AND 15 MINUTE QUADS
THIS MODEL ADDRESSES DRAINAGES THAT COULD IMPACT THE RWMS
ADJUSTED CURVE NUMBERS BY 10 TO ACCOUNT FOR MOISTED SOILS DURING THE 100-)

		E NUMBERS BY 10 TO ACCOUNT FOR		G THE 100-YR E	
12 10	OUTPUT CONTROL VARIABLE: IPRNT 5 IPLOT 0 QSCAL 0.	S PRINT CONTROL PLOT CONTROL HYDROGRAPH PLOT SCALE			
11		STARTING TIME NUMBER OF HYDROGRAPH ORDINATI			
.*	NDTIME 1457	ENDING DATE ENDING TIME CENTURY MARK			
	COMPUTATION INTERVAL TOTAL TIME BASE	.05 HOURS 14.95 HOURS			
	PRECIPITATION DEPTH INC LENGTH, ELEVATION FEE FLOW CUB STORAGE VOLUME ACR	T IC FEET PER SECOND E-FEET			
		ES REES FAHRENHEIT			• •
14 JD		PRECIPITATION DEPTH TRANSPOSITION DRAINAGE AREA			
15 PI	PRECIPITATION PATTERN 1.20 1.54 .36 .24	2.22 1.26 .78	1.02 1.10 .00 .00	1.26 1.06 .00 .00	.96
	.18 .26 .18 .32	.42 .22 .12 .54 .46 .42 .60 .80 .90 .84 .60 .48	.12 .10 .72 .64	.60 .76 .06 .06 .48 .24 .12 .52	.84 .06 .12
	1.62 1.68 2.04 2.10 .30 .28	.00 .00 .00 .00 .00 .42 .22 .12 .54 .46 .42 .60 .80 .90 .84 .60 .48 1.80 2.88 3.42 2.22 1.98 1.86 .24 .40 .48 .66 .74 .78 .12 .12 .12 .06 .14 .18	5.40 5.42 .42 .60 .48 .56	.12 .52 5.46 6.62 .96 .96 .72 1.12	7.20 96 1.32
	.96 .86 .18 .16 .06 .06	.66 .74 .78 .12 .12 .12 .06 .14 .18	.06 .10 .00 .02	.36 .36 .18 .06 .06 .06	.36 .00 .06
23 JD		PRECIPITATION DEPTH TRANSPOSITION DRAINAGE AREA			
0 PI	PRECIPITATION PATTERN 1.20 1.54 .36 .24 .18 .26	2.22 1.26 .78 .00 .00 .00	1.02 1.10 .00 .00 .36 .44	1.26 1.06 .00 .00 .60 .76	.96 .00 .84
	.54 .54 .18 .32 .30 .48	.54 .46 .42 .60 .80 .90	12 . 10	חג הג	.06 .12 .72
	1.62 1.68 2.04 2.10 .30 .28 .96 .86	1.80 2.88 3.42 2.22 1.98 1.86 .24 .40 .48 .66 .74 .78	.48 .56 1.20 .92	5.46 6.62 .96 .96 .72 1.12 .36 .36	7.20 .96 1.32 .36
	.18 .16 .06 .06	.12 .12 .12 .06 .14 .18	.06 .10 .00 .02	.18 .06 .06 .06	.00

24 JD	INDEX STORM NO. 3 STRM 1.38 TRDA 9.99	PRECIPITATION DEPTH TRANSPOSITION DRAINAGE AREA			
O PI	PRECIPITATION PATTERN 1.20 1.54 .36 .24 .18 .26 .54 .54 .18 .32 .30 .48	2.22 1.26 .78 .00 .00 .00 .42 .22 .12 .54 .46 .42 .60 .80 .90	1.02 1.10 .00 .00 .36 .44 .12 .10 .72 .64	.00 .00 .60 .76 .06 .06 .48 .24	.96 .00 .84 .06
	1.62 1.68 2.04 2.10 .30 .28	.84 .60 .48 1.80 2.88 3.42 2.22 1.98 1.86 .24 .40 .48	.18 .16 5.40 5.42 .42 .60 .48 .56	5.46 6.62 7 .96 .96 .72 1.12 1	.72 .20 .96 .32
	.96 .86 .18 .16 .06 .06	.66 .74 .78 .12 .12 .12 .06 .14 .18	1.20 .92 .06 .10 .00 .02	.18 .06	.36 .00 .06
25 JD	INDEX STORM NO. 4 STRM 1.38 TRDA 10.01	PRECIPITATION DEPTH TRANSPOSITION DRAINAGE AREA	·		
26 PI	PRECIPITATION PATTERN	.		'	

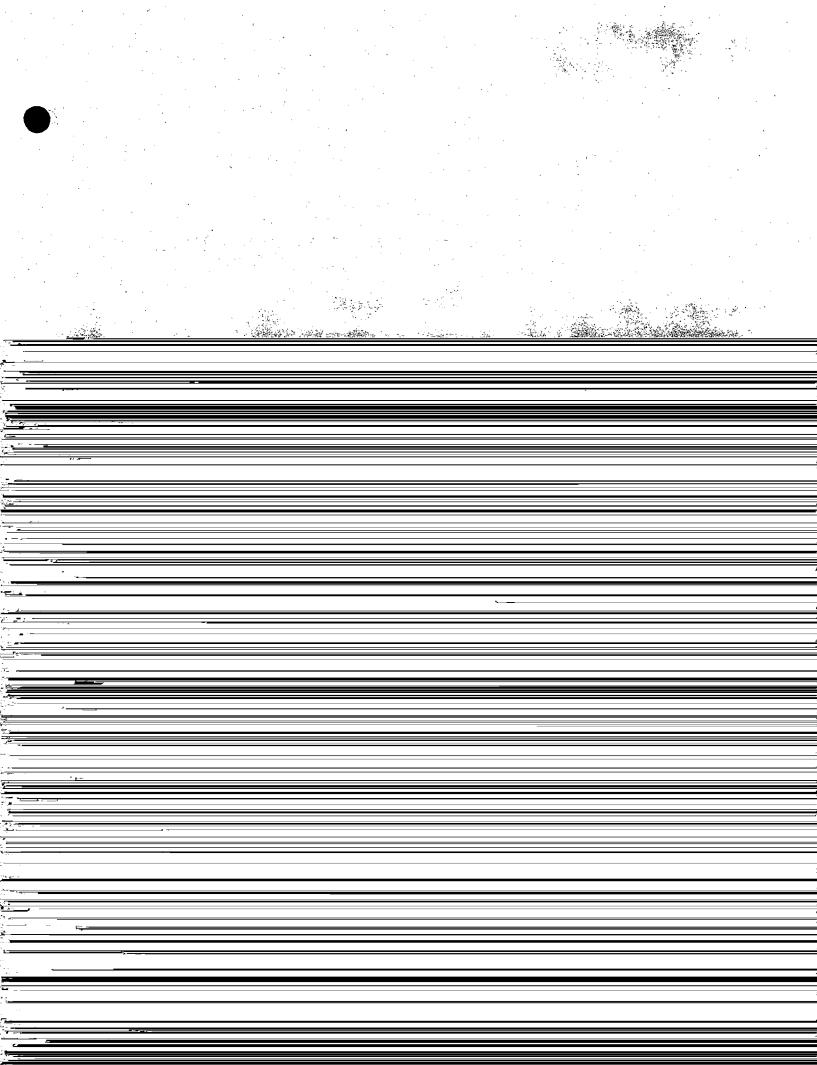
ſ

, , , , , , , , , , , , , , , , , , ,	.60 .56 .18 .26 .66 .62 60 .50 .36 .36 1.32 1.82	.48 .28 .42 .34 .54 .54 .30 .26 .36 .64 2.82 2.42	.30 .54 .24 .78	.54 .40 48 .52 36 .54 06 .18 .90 1.00 .82 3.26	.12 .60 .90 .42 1.20	.24 .3 .60 .6 .70 .6 .30 .2 1.48 1.6 4.58 4.8	0 0 4 2
	.60 .62 .54 .48 1.80 1.62 .30 .24 .12 .10	.66 1.06 .36 .52 1.26 1.54 .12 .12 .06 .14	1.26 1. .60 1.68 1.	82 3.26 .62 1.30 .36 .52 .68 1.20 .12 .16 .06 .08	.66 .84 .24 .24 .12	.42 .3 1.04 1.1 .24 .2 .12 .0 .08 .0	4
34 JD	INDEX STORM NO. 5 STRM 1.26 TRDA 20.00	PRECIPITATION DEP TRANSPOSITION DRA					•
O PI	PRECIPITATION PATTERN 1.20 1.58 .60 .56 .18 .26 .66 .62 .60 .50 .36 .36 1.32 1.82 .60 .62 .54 .48 1.80 1.62 .30 .24	2.34 1.62 .48 .28 .42 .34 .54 .54 .30 .26 .36 .64 2.82 2.42 .66 1.06 .36 .52 1.26 1.54	.18 .30 .54 .24 .78 2.22 2 1.26 1 .60 1.68 1	.12 .16	2.04 .12 .60 .90 .42 1.20 4.14 .66 .84 .24	.92 .3 .24 .3 .60 .6 .70 .6 .30 .2 1.48 1.6 4.58 4.8 .42 .3 1.04 1.1 .24 .2	50 50 50 50 50 50 50 50 50 50 50 50 50 5
35 JD	.12 .10 INDEX STORM NO. 6 STRM 1.18 TRDA 30.00	.06 .14 PRECIPITATION DEP TRANSPOSITION DRA	TH	.06 .08	.12	.08 .0	16
O PI	PRECIPITATION PATTERN 1.20 1.58 .60 .56 .18 .26 .66 .62 .60 .50 .36 .36 1.32 1.82 .60 .62 .54 .48 1.80 1.62 .30 .24 .12 .10	2.34 1.62 .48 .28 .42 .34 .54 .54 .30 .26 .36 .64 2.82 2.42 .66 1.06 .36 .52 1.26 1.54 .12 .12	.18 .30 .54 .24 .78 2.22 2 1.26 1 .60 1.68 1	.80 1.88 .54 .40 .48 .52 .36 .54 .90 1.00 .82 3.26 .62 1.30 .36 .52 .68 1.20 .12 .16	2.04 .12 .60 .90 .42 1.20 4.14 .66 .84 .24 .24	.92 .3 .24 .3 .60 .6 .70 .6 .30 .2 1.48 1.6 4.58 4.8 .42 .3 1.04 1.1 .24 .2 .12 .0	0 0 0 4 2 0 0 4 4 6
36 JD 0 PI	INDEX STORM NO. 7 STRM 1.09 TRDA 50.00 PRECIPITATION PATTERN	PRECIPITATION DEP TRANSPOSITION DRA	TH INAGE AREA				

KADNI	STORM STRM TRDA	NO. 8 .96 100.00								
PRE	CIPITA1 1.20 .60	1.58	2.34	1.62 .28	1.26	1.80	1.88 .40	2.04 .12	.92 .24	.36 .30
	.18 .66 .60	.26 .62 .50	.42 .54 .30	.34 .54 .26	.30 .54 .24	.48 .36 .06	.52 .54 .18	.60 .90 .42	.60 .70 .30	.60 .60 .24
. '	1.32	1.82 .62	2.82	2.42 1.06	2.22 1.26	2.82 1.62	3.26 1.30	4.14	4.58 .42	1.62 4.80 .30
	1.80 .30	1.62 .24 .10	1.26	1.54 1.54 .12	1.68	1.68	1.20 16	.84 .24 .24 .12	.24 .12	1.14 .24 .06
		STRM TRDA PRECIPITA 1.20 .60 .18 .66 .60 .36 1.32 .60	TRDA 100.00 PRECIPITATION PATTERN 1.20 1.58 .60 .56 .18 .26 .66 .62 .60 .50 .36 .36 1.32 1.82 .60 .62 .54 .48 1.80 1.62	STRM .96 PRECIPITATION PATTERN 1.20 1.58 2.34 .60 .56 .48 .18 .26 .42 .66 .62 .54 .60 .50 .30 .36 .36 .36 1.32 1.82 2.82 .60 .62 .66 .54 .48 .36 1.80 1.62 1.26 .30 .24 .12	STRM	STRM 100.00 PRECIPITATION DEPTH TRDA 100.00 TRANSPOSITION DRAINAGE AREA	STRM	STRM 100.00 TRANSPOSITION DEPTH TRANSPOSITION DRAINAGE AREA PRECIPITATION PATTERN 1.20 1.58 2.34 1.62 1.26 1.80 1.88 .60 .56 .48 .28 .18 .54 .40 .18 .26 .42 .34 .30 .48 .52 .66 .62 .54 .54 .54 .36 .54 .60 .50 .30 .26 .24 .06 .18 .36 .36 .36 .36 .64 .78 .90 1.00 1.32 1.82 2.82 2.42 2.22 2.82 3.26 .60 .62 .66 1.06 1.26 1.62 1.30 .54 .48 .36 .52 .60 .36 .52 1.80 1.62 1.26 1.54 1.68 1.68 1.20 .30 .24 .12 .12 .12 .16	STRM	STRM

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

•	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE 6-HOUR	FLOW FOR MAX	IMUM PERIOD 72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
•	HYDROGRAPH AT	MM1A	426.	3.75	70.	28.	28.	.90		
+	HYDROGRAPH AT	BW1	5241.	6.00	2989.	1289.	1289.	60.50	· ·	
, •••	HYDROGRAPH AT	BW2	2759.	4.35	1102.	445.	445.	20.80		
•	2 COMBINED AT	8w1&2	6018.	5.65	3425.	1462.	1462.	81.30		
+	2 COMBINED AT	BW APX	6014.	5.65	3441.	1469.	1469.	82,20		
+	HYDROGRAPH AT	мм1в	580.	3.95	120.	48.	48.	2.10		
+	HYDROGRAPH AT	MM2	477.	3.95	98.	39.	39.	1.40		
•	HYDROGRAPH AT	HP1A	423.	3.90	91.	37.	37.	.80		
•:	ROUTED TO	RTCPA	401.	4.35	91.	37.	37.	.80	•	
•	HYDROGRAPH AT	HP18	309.	4.00	66.	27.	27.	1.00		•
•	HYDROGRAPH AT	HP2	365.	4.00	78.	32.	32.	1.20		
•	4 COMBINED AT	CPA1	1229.	4.05	298.	120.	120.	4.40	•	
• .	HYDROGRAPH AT	HP3	624.	4.05	148.	59.	59.	1.70	•	,
•	2 COMBINED AT	CPA2	1757.	4.05	423.	170.	170.	6.10		
•	HYDROGRAPH AT	HP4	984.	4.00	214.	86.	86.	3.30		
+ .	HYDROGRAPH AT	HP5	526.	3.75	85.	34.	34.	1.20		*
•	HYDROGRAPH AT	HP6	711.	4.00	160.	64.	64.	2.20		
+	ROUTED TO	RTCPD	689.	4.30	160.	64.	64.	2.20		
•	HYDROGRAPH AT	HPFA	110.	3.80	19.	8.	8.	.30		•
•	3 COMBINED AT	CPD	884.	4.15	246.	99.	99.	3.70	1	
`+	ROUTED TO	RTCPE	868.	4.50	246.	99.	99.	3.70	*	·
•	HYDROGRAPH AT	HPF8	476.	3.90	94.	38.	38.	1.60		
+	3 COMBINED AT	CPE	1819.	4.10	502.	202.	202.	8.60		•
•	2 COMBINED AT	CPF	2396.	4.05	820.	330.	330.	14.70	•	•
•	HYDROGRAPH AT	sc1	3498.	6.00	1988.	855.	855.	39.40		,
· · · · · · · · · · · · · · · · · · ·	HYDROGRAPH AT	sc2	427.	3.95	89.	36.	36.	1.50		



RUN DATE 01/29/1993 TIME 22:03:06

U.S. ARMY CORPS OF ENGINEERS HYDROLOGIC ENGINEERING CENTER 609 SECOND STREET DAVIS, CALIFORNIA 95616 (916) 756-1104

X X XXXXXXX XXXXX X X X X X X X XXXXXXX XXXX X XXXXX X

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRANT? VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
FLOOD ASSESSMENT FOR RWMS JOB #:51056
                  ID
                                                                                             FILE: RWMSC.DAT
                         100-YEAR 6-HOUR STORM 2.43 INCHES
POINT RAINFALL VALUES FROM NOAA ATLAS 2 VOL VII
ADJUSTED RAINFALL PER CORRECTION FACTOR IN TABLE 501 OF
                  ID
                  10
                  ID
                          CLARK COUNTY HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL (CCRFCD, 1990)
                  ID
                         DEPTH-AREA REDUCTION FACTORS FROM TABLE 502 IN CCRFCD, 1990 CURVE NUMBERS DETERMINED USING TABLE 602 IN CCRFCD, 1990 LAG TIMES DETERMINED USING METHOD IN SECITON 606.3 IN CCRFCD, 1990 DRAINAGE AREAS FROM 7.5 MINUTE AND 15 MINUTE QUADS THIS MODEL ADDRESSES DRAINAGES THAT COULD IMPACT THE RUMS
 67
                  ID
                   ID
 8
                  ID
                  10
10
                   ID
                   *DIAGRAM
                  IT
                                                                300
12
                  10
13
                  IN
14
                   JĐ
                           2.43
                  * RAI
                          NFALL DISTRIBUTION FROM CLARK COUNTY MANUAL LESS THAN 10 SQ. MILES 0 2 5.7 7.0 8.7 10.8 12.4 13.0 1
                                                                                                             13.0
15.8
15
                  PC
                                                                                                  12.4
                                                                                                                         13.0
                                                                                                                                     13.0
                                       13.0
                                                                                                                                    18.1
24.9
40.9
                                                                                                                         17.2
16
                  PC
                            13.0
                                                   13.0
                                                               13.3
                                                                          14.0
                                                                                      14.2
                                                                                                  14.8
                                                                                      20.4
28.3
                                                                                                 21.4
29.5
                           19.0
                                                                                                             22.9
32.2
                                                                                                                        24.1
35.2
17
                                                                          20.1
                  PC
                                       19.7
                                                   19.9
                                                               20.0
18
                                       25.6
                                                   27.0
                                                               27.8
                                                                          28.1
                  PC
                                                                                                 81.9
93.7
                                                                                                                        85.1
97.0
                                       59.0
                                                                                                                                    85.6
97.6
19
                  PC
                            49.9
                                                   71.0
                                                               74.4
                                                                          78.1
                                                                                      81.2
                                                                                                             83.5
                           86.0
                                                  87.6
98.7
20
                   PC
                                       86.8
                                                               88.8
                                                                          91.0
                                                                                      92.6
                                                                                                             95.0
21
                  PC
                            98.2
                                       98.5
                                                                                      99.3
                                                               98.9
                                                                          99.0
                                                                                                  99.3
                                                                                                                                     99.8
22
                  PC
                            99.8
                                       99.9
                                                 100.0
                            2.36
23
                   JD
24
                            2.09
                   JD
                                       9.99
                                     INFALL DISTRIBUTION ABOVE 10 SQ. MILES PER CLARK COUNTY MANUAL
                     CHANGED RA
25
26
                                      10.01
                            2.09
                   JD
                  PC
                               0
                                                                8.0
                                                                                                             16.0
27
28
29
                                                                                                                                    24.1
31.7
                  PC
                            18.0
                                       18.2
                                                   18.7
                                                               19.0
                                                                          19.7
                                                                                      20.2
                                                                                                 21.0
                                                                                                             22.0
                                                                                                                        23.0
                           25.0
32.1
                                       25.9
32.7
                   PC
                                                   26.5
                                                               28.0
                                                                          29.0
                                                                                      30.0
                                                                                                 30.5
                                                                                                             30.9
                                                                                                                        31.0
                                                                                      38.1
                                                                                                             43.0
                                                                                                                        47.7
79.5
                   PC
                                                   33.3
                                                               34.6
                                                                          36.1
                                                                                                 40.8
                                                                                                                                    51.4
30
                   PĈ
                            56.1
                                       63.0
                                                   71.0
                                                               72.0
                                                                          73.1
                                                                                      75.2
                                                                                                 77.9
                                                                                                             79.0
                                                                                                                                    80.4
31
                   PC
                            81.0
                                       82.0
                                                   82.6
                                                               84.0
                                                                          85.9
                                                                                      88.9
                                                                                                 91.0
                                                                                                             93.8
                                                                                                                         96.6
                                                                                                                                    97.0
32
33
                   PC
                            97.4
                                       97.9
                                                   98.1
                                                               98.3
                                       99.9
20
                   PC
                            99.7
                                                 100.0
34
                   JD
                            1.92
35
                   JD
                            1.80
36
                            1.65
                   JD
37
                   JD
                            1.46
                   KK
                            MM1A
39
                   KM
                          Basin runoff calculation for Mass. Mountains 1A
40
                  BA
41
                   LS
42
                             .31
                  UD
43
                             BW1
                  KK
44
45
47
                   KM
                             Basin runoff calculation for Barren Wash 1
                  BA
                            60.5
                                          83
                   15
                             2.1
                   UD
```

```
BW2
              KK
                     Basin runoff calculation for Barren Wash 2 20.8
              BA
LS
              UD
53
54
55
              KK
                    BW1&2
              KM
                    Combined BW1 and BW2
              HC
56
57
              KK
                    Combine BW1, BW2, and MM1A (assume dischaarge of Barren Wash "active apex")
              KM
              HC
59
              KK
60
                     Basin runoff calulation for Mass. Mountains 18
```

```
will not directly impact RWMS wereas a channel migration at the apex could impact the \ensuremath{\mathsf{RVMS}}
                 BA
LS
61
62
63
                          2.1
                          .48
                 UD
64
65
66
67
                         Basin runoff calculation for Mass. Mountains 2
                 BA
LS
68
                 UD
                           .47
69
70
71
72
73
                         Basin
                                 runoff calculation for Half Pint Range 1A
                 BA
LS
                           .8
                 UD
                           .48
74
75
76
                        Route Flow from HP1A to CPA
9 .43 .2
                 KM
                 RM
77
78
79
80
81
                         Basin runoff calculation for Half Pint Range 18
                 ВА
                          1.0
                 LS
                 UD
                           .51
82
83
84
85
86
                 KM
                         Basin
                                 runoff calculation for Half Pint Range 2
                 BA
                         1.2
                 LS
                                      78
                 UD
                           .51
                 ΚK
                         CPA1
                 KM
                         Combine MM2, routed HP1A, HP1B, HP2
                 HC
                 KK
                           (CPB) Basin runoff calculation for Half Pint Range 3
                 KM
```

```
94 UD .59

95 KK CPA2
96 KM Combine HP3 with flow from CPA1
97 HC 2

98 KK HP4
99 KM (CPC) Basin runoff calculation for Half Pint Range 4
100 BA 3.3
101 LS 79
```

116 117 118 119 120	K K B L U	Basin runoff calculation for Half Pint Range FA 3 S 77
121 122 123	K K H	Combine HP5, routed HP6, and HPFA
124 125 126	K K R	M Route flow from CPD to CPE
127 128 129 130 131	K K B L	M Basin runoff calculation for Half Pint Range FB A 1.6 S 77
132 133 134	K K H	K CPE M Combine HP4 (CPC) with routed flow from CPD, and HPFB
135 136 137	K K H	M Combine all flow at Concentration just below RUMS (Flow from CPA & CPE)
138 139	· K	K SC1 M Basin runoff calculation for Scarp Canyon 1 Concentration Pt of this watershed is the active apex of the Scarp Canyon Fan
140	В	A 39.4
141		S 82
142	U	D 2.1
143 144 145		K SC2 M Basin runoff calculation for Scarp Canyon 2 A 1.5
146		s 77
147	Ü	D .48
148	, 7	7

SCHEMATIC DIAGRAM OF STREAM NETWORK

NPUT LINE	(V) RO	CREMATIC DIAG Uting		VERSION OR P	UMP FLOW	•					
NO.	(.) CO	NNECTOR	(<) RETURN OF DIVERTED OR PUMPED FLOW								
38	MMÍA			*							
43	•	BW1				·					
48	•	•	BW2	!							
53	•	BW1&2.				•					
56	BW APX			**			* * * * * * * * * * * * * * * * * * *				
59		MM1B									
64	•	•	MM2								
69	•	•	•	HP1A V							
74	•	•	•	RTCPA							
77	•	•	•	•	HP1B	, ,					
82	` •			•	•	HP2					
87		•	CPA		•	•					
90	•		, ,	HP3							
95	•		CPA	•			•				
98	•	•		HP4							
103			•	•	HP5						
108					•	HP6 V					
113				ωį.		RTCPD					
116	•		· ·			•	HPFA				
121					CPD V V	• !	••••••				
124					RTCPE						
127						HPFB	-				
132				CPE	•						
135			CPI	·							
138		•		SC1							
143		•		•	SC2						

RUN DATE 01/29/1993 TIME 22:03:06

U.S. ARMY CORPS OF ENGINEERS HYDROLOGIC ENGINEERING CENTER 609 SECOND STREET
DAVIS, CALIFORNIA 95616
(916) 756-1104

FLOOD ASSESSMENT FOR RWMS JOB #:51056 FILE: RWMSC.DAT
100-YEAR 6-HOUR STORM 2.43 INCHES
POINT RAINFALL VALUES FROM NOAA ATLAS 2 VOL VII
ADJUSTED RAINFALL PER CORRECTION FACTOR IN TABLE 501 OF
CLARK COUNTY HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL (CCRFCD, 1990)
DEPTH-AREA REDUCTION FACTORS FROM TABLE 502 IN CCRFCD, 1990
CURVE NUMBERS DETERMINED USING TABLE 602 IN CCRFCD, 1990
LAG TIMES DETERMINED USING METHOD IN SECITON 606.3 IN CCRFCD, 1990
DRAINAGE AREAS FROM 7.5 MINUTE AND 15 MINUTE QUADS
THIS MODEL ADDRESSES DRAINAGES THAT COULD IMPACT THE RWMS

				, , , , , , , , , , , , , , , , , , , ,								•	
. 12	10			OUTPUT CONTRO	VARIARIE:	s ·							
	•••			IPRNT		PRINT C	ONTROL			• .			
•				IPLOT		PLOT CO							
		,		QSCAL	o.		APH PLOT S	CALE					
				A2CME	٠.	. HIDROGK	Arn FLOT 3	CALL			×		
				HYDROGRAPH TI	ME DATA								1.5
	IT					MINITER	THE COMPUT	ATION INTE	DUAL				
	-			NMIN	. 3			ATION INTE	RVAL	•			
				IDATE	1 0								
				ITIME	0000	•		124 222				•	
				NQ	300			APH ORDINA	TES		•		
				NDDATE	1 0	ENDING	DATE						
				NDTIME	1457	ENDING	TIME				•		
				ICENT	19	CENTURY	MARK						
					1.			•					
•				COMPUTATION	INTERVAL	.05 н	OURS						
					TIME BASE	14.95 H						•	
			٠ .	·	TITL DAGE	14172 1	OUK O		•		,		
			ENGL 1	SH UNITS		•		. •				t	
			LNGL		COLL	ADÉ MILEO	**						•
		•		DRAINAGE AREA		ARE MILES					•		
				PRECIPITATION D									
				LENGTH, ELEVATI									•
				FLOW			ER SECOND						
				STORAGE VOLUME		E-FEET		* *				•	
				SURFACE AREA	ACR						•		
,			٠.	TEMPERATUR E	DEG	REES FAHR	ENHEIT.						
•				9	•			.*					
14	J)		INDEX STORM N	0. 1							,	
				STRM		PRECIPI	TATION DEP	TH					
				TRDA				INAGE AREA	١.				
1				11.011					•				
15	5 P	1		PRECIPITATI	ON DATTERN								
	, ,	•		1.20	ON PALIEN	2.22	1.26	-78	1 02	. 4 40	1.26	1.06	04
					1.54	2.22	1.20		1.02	1.10			.96
				.36	.24	.00	.00	.00	.00	.00	.00	.00	.00
		٠.,		.18	.20	.42	.22	.12	.36	.44	.60	.76	. 84
				.54	.54	.54	.46	.42	.12	.10	.06	.06	.06
				. 18	.32	.60	.80	.90	77	.64	.48	.24	.12
				.30	.48	.84	.60	.40	. 18	.16	.12	.52	.72
				1.62	1.68	1.80	2.88	3.42	5 40	5 42	5.46	6.62	7.20
				2.04	2.10	2.22	1.98	1 84	.42	.60	.96	.96	.96
	-			.30	.28	.24 .66	.40	.48	.48	.56 .92	.72	1.12	1.32
				.96	.86	.66	74	.78	1.20	. 92	.36	.36	.36
				.18	.16	.12	.12	.12	.06	.10	.18	.06	.00
				.06	.06	.06	.14	.18	.00	.02	.06	.06	.06
				.00	.00	.00	. 17		.00	.02	.00	.00	.00
27	3 JI	n		INDEX STORM N	n 2				**				
۷.	, ,,					DDECIDI	TATION DEP	TU.					
				STRM									
				TRDA	1.00	IRANSPU	STITUN DEA	INAGE AREA					
٠.													
(0 P	1		PRECIPITATI									
				1.20	1.54	2.22	1.26	.78	1.02	1.10	1.26	1.06	.96
				.36	.24	.00	.00	.00	.00	.00	.00	.00	.00
	100			.18	.26	.42	.22	.12	.36	.44	.60	.76	.84
			*	.54	.54	.54	.46	.42	.12	.10	.06	.06	.06
			•	.18	.32	.60	.80	.90	.72	.64	.48	.24	.12
				.30	.48	.84	.60	.48	19		.12	52	
		. ,					.00 ⊱		.18	.16	- 14		.72
				1.62	1.68	1.80	2.88	3.42	5.40	5.42	5.46	6.62	7.20
				2.04	2.10	2.22	1.98	1.86	.42	.60	.96	.96	.96
												4 4 4	
				.30	.28	.24	.40	.48	.48	.60 .56	.72	1.12	1.32
		٠, .			.28 .86	.24 .66	.40 .74		.48 1.20	. 92	.72	1.12 .36	1.32 .36
		•,		.30	.28 .86	.24 .66	.40 .74	.48	.48 1.20	. 92	.72 .36 .18		.36
		·, .		.30 .96	.28	.24	.40	.48 .78	.48	.56 .92 .10 .02	.72 .36	.36	1.32 .36 .00 .06

24 JD	INDEX STORM NO. 3 STRM 2.09 TRDA 9.99	PRECIPITATION DEPTH TRANSPOSITION DRAINAGE AREA			
0 PI	PRECIPITATION PATTERN 1.20 1.54 .36 .24 .18 .26 .54 .54 .18 .32 .30 .48 1.62 1.68 2.04 2.10 .30 .28 .96 .86 .18 .16	2.22 1.26 .78 .00 .00 .00 .42 .22 .12 .54 .46 .42 .60 .80 .90 .84 .60 .48 1.80 2.88 3.42 2.22 1.98 1.86 .24 .40 .48 .66 .74 .78 .12 .12 .12	1.02 1.10 .00 .00 .36 .44 .12 .10 .72 .64 .18 .16 5.40 5.42 .42 .60 .48 .56 1.20 .92 .06 .10	1.26 1.06 .00 .00 .60 .76 .06 .06 .48 .24 .12 .52 5.46 6.62 .96 .96 .72 1.12 .36 .36 .18 .06	.96 .00 .84 .06 .12 .72 7.20 .96 1.32 .36
25 JD	.06 .06 INDEX STORM NO. 4 STRM 2.09 TRDA 10.01	.06 .14 .18 PRECIPITATION DEPTH TRANSPOSITION DRAINAGE AREA	.00 .02	.06 .06	.06
26 PI	PRECIPITATION PATTERN 1.20 1.58 .60 .56	2.34 1.62 1.26 .48 .28 .18	1.80 1.88 .54 .40	2.04 .92 .12 .24	.36

	.60 .62 .54 .48	.30 .36 2.82 .66 .36 1.26 .12	.26 .64 2.42 1.06 .52 1.54 .12	.24 .78 2.22 1.26 .60 1.68 .12	.90 2.82 1.62	1.30 .52 1.20	.42 1.20 4.14 .66 .84 .24 .24	4.58	4.80 .30 1.14
34 JD	INDEX STORM NO. 5 STRM 1.9 TRDA 20.0	PZ PRECIPI DO TRANSPO	TATION DEP SITION DRA	TH INAGE AREA			:		
0 P1	PRECIPITATION PATTER 1.20 1.58 .60 .56 .18 .26 .66 .62 .60 .50 .36 .36 1.32 1.82 .60 .62 .54 .48 1.80 1.62 .30 .24 .12 .10	2.34 .48 .42 .54 .30 .36 2.82 .66 .126 .12	1.62 .28 .34 .54 .26 .64 2.42 1.06 .52 1.54 .12	1.26 .18 .30 .54 .24 .78 2.22 1.26 .60 1.68 .12 .18	1.80 .54 .48 .36 .06 .90 2.82 1.62 .36 1.68 .12	1.88 .40 .52 .54 .18 1.00 3.26 1.30 .52 1.20 .16	2.04 .12 .60 .90 .42 1.20 4.14 .66 .84 .24 .12		.60 .60 .24 1.62 4.80 .30 1.14
35 JD	INDEX STORM NO. 6	80 PRECIPI 00 TRANSPO	TATION DEP	Th			~		
0 PI	PRECIPITATION PATTE 1.20 1.58 .60 .56 .18 .26 .66 .62 .60 .50 .36 .36 1.32 1.82 .60 .62 .54 .48 1.80 1.62 .30 .24 .12 .10	2.34 .48 .42 .54 .30 .36 2.82 .66 .36 1.26 .12	1.00	1.20	1.02 36	3.26 1.30	.60 .90 .42 1.20 4.14 .66	1.04 24	.36 .30 .60 .24 1.62 4.80 .30 1.14 .24 .06
36 JD	INDEX STORM NO. 7 STRM 1 TRDA 50.	65 PRECIPI 00 TRANSPO	TATION DEP	TH INAGE AREA	. ,		•		*

PRECIPITATION PATTERN

37 J	D			INDEX STORM STRM TRDA	1.46	PRECIPI TRANSPO	TATION DEP			•			
0 P	t			PRECIPITA				4.07		4.00	2.04		:
				1.20	1.58	2.34	1.62 .28	1.26 .18	1.80 .54	1.88 .40	2.04	.92 .24	.36
			٠.	.60 18	.56 .26	.48 .42	.20	.30	.48	52	.60	.60	.60
				.66	.62	.54	.54	.54	.36	.54	.90	.70	.60
				.60	.50	.30	. 26	.24	.06	.18	.42	.30	.24
		` .		.36	.36	.36	.64	.78	.90	1.00	1.20	1.48	1.62
•				1.32	1.82	2.82	2.42	2.22	2.82	3.26	4.14	4.58	4.80
				.60	.62	.66	1.06	1.26	1.62	1.30	.66	.42	.30
		•		.54	.48	.36	.52	.60	.36	.52	.84	1.04	1.14
	•	,		1.80	- 1.62	1.26	1.54	1.68	1.68	1.20	.24	.24	.24
,	*			.30	.24	.12	.12	.12	.12	.16	.24	.12	.06
			- 1	. 12	.10	.06	14	.18	06	.08	. 12	08	.06

RUNOFF SUMMARY FLOW IN CUBIC FEET PER SECOND TIME IN HOURS, AREA IN SQUARE MILES

TIME OF MAX STAGE

•	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FL	OW FOR MAXIMU	M PERIOO 72-HOUR	BASIN AREA	MAXIMUM STAGE
•	HYDROGRAPH AT	MM1A	467.	3.75	77.	31.	31.	.90	
•	HYDROGRAPH AT	BW1	4883.	6.15	2699.	1141.	1141.	60.50	
. •	HYDROGRAPH AT	BW2	2778.	4.40	1133.	456.	456.	20.80	
•	2 COMBINED AT	BW1&2	5498.	5.75	3049.	1282.	1282.	81.30	
+	2 COMBINED AT	BW APX	5488.	5.75	3060.	1287.	1287.	82.20	
• · · .	HYDROGRAPH, AT	MM1B	644.	4.00	136.	55.	55.	2.10	
•	HYDROGRAPH AT	MM2	526.	3.95	108.	44.	44.	1.40	
•	HYDROGRAPH AT	HP1A	444.	3.95	92.	37.	37.	.80	
•	ROUTED TO	RTCPA	420.	4.40	92.	37.	37.	.80	
.	HYDROGRAPH AT	HP18	346.	4.00	75.	30.	30.	1.00	,
+ . *	HYDROGRAPH AT	HP2	407.	4.00	89.	36.	36.	1.20	
,	4 COMBINED AT	CPÁ1	1297.	4.05	317.	127.	127.	4.40	
+ *	HYDROGRAPH AT	нр3	661.	4.05	156.	63.	63.	1.70	
•	2 COMBINED AT	. CPA2	1827.	4.10	442.	177.	177.	6.10	
+	HYDROGRAPH AT	нР4	1060.	4.00	233.	94.	94.	3.30	
•	HYDROGRAPH AT	HP5	582.	3.75	94.	38.	38.	1.20	
•	HYDROGRAPH AT	HP6	766.	4.05	174.	70.	70.	2.20	
•	ROUTED TO	RTCPD	741.	4.30	174.	70.	70.	2.20	
•	HYDROGRAPH AT	HPFA	125.	3.80	21.	9.	, <i>(</i> 9.	.30	
+	3 COMBINED AT	CPD	945.	4.15	266.	107.	107.	3.70	
•	ROUTED TO	RTCPE	927.	4.55	266.	107.	107.	3.70	
•	HYDROGRAPH AT	HPFB	533.	3.95	107.	43.	43.	1.60	
•	3 COMBINED AT	CPE	1898.	4.10	537.	215.	215.	8.60	
•	2 COMBINED AT	CPF	2462.	4.05	854.	343.	343.	14.70	
.	HYDROGRAPH AT	sc1	3438.	6.15	1900.	804.	804.	39.40	
•	HYDROGRAPH AT	SC2	478.	4.00	101.	41.	41.	1.50	
17			4.		* .				

HEC-1 MODEL OUTPUT

FILENAME: RWMS10.OUT

(10-YEAR MODEL)

RUN DATE 01/29/1993 TIME 22:05:10

U.S. ARMY CORPS OF ENGINEERS HYDROLOGIC ENGINEERING CENTER 609 SECOND STREET DAVIS, CALIFORNIA 95616 (916) 756-1104

Х	X	XXXXXXX	XX	XXX		X
Х	X	X	Х	X		XX
X	X	X.	Х		•	X
XXX	XXXX	XXXX	Х		XXXXX	X
X	X	X	Х			X
X	X	X	X	X		X
X	- X	XXXXXXX	XX	XXX		XXX

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 2 3 4 5 6 7 8		ID ID ID ID ID ID	10-YEA POINT DEPTH- CLARK CURVE LAG TI	ASSESSMEI R 6-HOUR RAINFALL AREA REDI COUNTY H NUMBERS I MES DETEI GE AREAS	STORM VALUE UCTION YDROLOG DETERMI MINED L	1.1 II FROM I FACTOR GIC CR. NED US	NCHE NOAA RS F ITER SING METH	S ROM TAE IA AND TABLE OD IN S	2 VOL DRAINA 602 IN ECTION	VI IN GE CC	DESIGN CRFCD, 06.3 IN	MAN 1990	IUAL	(CCF	-	1990)	
9		ID	THIS M	ODEL ADD								RWM	S				
10 11 12 13	,	*DI IT IO IN JD	AGRAM 3 5 5 1.1	.01	. () :	300										
		* R	AINFALL	DISTRIBU													_
14 15		PC PC	13.0	13.0	5.7 13.0		7.0 3.3	8.7 14.0		.8	12. 14.		13. 15.		13.0 17.2		.0
16		PC	19.0	19.7	19.9	2	0.0	20.1	20	1.4	21.	4	22.	9	24.1	24	.9
17 18		PC PC	25.1 49.9	25.6 59.0	27.0 71.0		7.8	28.1 78.1		.2	29. 81.	5	32. 83.		35.2 85.1		.6
19		PC	86.0	86.8	87.6		3.8	91.0		.6	93.		95.		97.0		.6
20		PC	98.2	98.5	98.7		3.9	99.0	99	.3	99.	3	99.	4	99.5	99	8.
21 22		PC JD	99.8 1.07	99.9 1	100.0	,											
23		JD	.95	9.99			٠.										
21			HANGED	RAINFALL	DISTRI	BUTION	ABC	VE 10 9	Q. MIL	ES	PER CL	ARK	COUN	ITY F	IANUAL		
24 25 26	•	JD PC PC	.95 0 18.0	10.01 2.0 18.2	5.9 18.7		3.0 9.0	11.0 19.7	14	.4	15. 21.		16. 22.		16.8		.1
27		PC	25.0	25.9	26.5	5 2	3.0	29.0	. 30	0.0	30.	5	30.	9	31.0	31	.7
28 29		PC PC	32.1 56.1	32.7 63.0	33.3 71.0		2.0	36.1 73.1		.1	40. 77.		43. 79.		47.7 79.5		
30		PC	81.0	82.0	82.6		4.0	85.9		. 9	91.		93.		96.6		
31		PC	97.4		98.		3.3	98.5	98	.9	99.	0	99.	2	99.3	99	.6
32 33		JD.	99.7 .87	99.9 20	100.0)											
34		JD	.81	30													
35		JD	.75	50				•									
36		JD	.66	100												••	
37		KK	MM1A				•		, .				*				•
38		KM.		runoff c	alculat	tion fo	or M	ass. Mo	untain	s 1	A						
39 40		BA LS	.9	80								•					
41		UD	.31											•			
42 43	+	KK KM	BW1	in runoff	calcul	ation	for	Rarrer	Wach	1							
44		BA	60.5	1 (41(4)) 1	catcui	ac ion	101	שם ו כו	#4311	•		*					
45		LS		83													
46		UD	2.1									•					

```
KK
KM
                          BW2
48
49
50
51
                          Basin runoff calculation for Barren Wash 2
                 BA
                         20.8
                LS
                           .9
52
53
54
                 KK
KM
HC
                       BW1&2
                       Combined BW1 and BW2
55
56
57
                 KK
                 KM
                       Combine BW1, BW2, and MM1A (assume dischaarge of Barren Wash "active apex")
                 HC
 58
59
                 KK
                         MM1R
                      Basin runoff calulation for Mass. Mountains 1B
Flow was not combined with BW APX because flow from this watershed
will not directly impact RWMS wereas a channel migration at the apex
could impact the RWMS
                KM
 60
                 BA
                          2.1
                                     77
 61
62
                 LS
                          .48
                 UD
 63
                          MM2
64
65
                 KM
                         Basin runoff calculation for Mass. Mountains 2
                 BA
                          1.4
 66
                 LS
                          .47
 67
                 UD
                         HP1A
68
69
70
71
72
                 KK
                 KM
                         Basin runoff calculation for Half Pint Range 1A
                 BA
                           .8
                                      85
                 LS
                          .48
                 UD
 73
74
75
                       RTCPA
                 KK
                       Route Flow from HP1A to CPA
9 .43 .2
                 KM
                 RM
 76
77
                         HP18
                 KM
                         Basin
                                runoff calculation for Half Pint Range 1B
 78
79
                 BA
                          1.0
                 LS
                                      78
 80
                 UD
                         .51
                          HP2
 82
83
                 KM
                         Basin runoff calculation for Half Pint Range 2
                 ВА
                         1.2
 84
 85
                 UD
                          .51
 86
87
                         CPA1
                         Combine MM2, routed HP1A, HP1B, HP2
 88
                          (CPB) Basin runoff calculation for Half Pint Range 3
                 BA
 92
93
                 LS
                 UD
                          .59
 94
                         CPA2
                 KM
                         Combine HP3 with flow from CPA1
                 HC
 97
                 KM
 98
                          (CPC) Basin runoff calculation for Half Pint Range 4
 99
                 ВА
                          3.3
100
                 LS
                                      79
101
                 UD
                          .52
                          HP5
102
103
                 KM
                          Basin runoff calculation for Half Pint Range 5
104
                 BA
                          1.2
105
                 LS
                           .3
106
                 UD
107
                          нР6
108
                 ΚŃ
                          Basin runoff calculation for Half Pint Range 6
109
                 BA
                          2.2
110
                 ĹŠ
                                      80
                          .55
                 UD
112
113
114
                       RTCPD
                 KK
                 KM
RM
                         Route HP6 to CPD
```

115 116 117	KK KM BA	HPFA Basin runoff	calculation	for	Hal f	Pint	Range	FA
118	LS	77						
119	UD	.33						

121 122	KM HC	Combine HP5	, routed HP6,	and H	PFA			
123	KK	RTCPE		•				

```
126
127
128
129
130
                    KK
KM
BA
LS
UD
                             Basin runoff calculation for Half Pint Range FB
                               1.6
                                           77
                               .44
                    KK
KM
HC
                             CPE Combine HP4 (CPC) with routed flow from CPD, and HPF8 3
134
135
136
                    KK
KM
HC
                             CPF
Combine all flow at Concentration just below RWMS (Flow from CPA & CPE)
2
                    KK SC1

KM Basin runoff calculation for Scarp Canyon 1

* Concentration Pt of this watershed is the active apex of the Scarp Canyon Fan

BA 39.4

82
137
138
                    BA
LS
UD
139
140
141
                               2.1
                    KK
KM
BA
LS
UD
ZZ
                              Basin runoff calculation for Scarp Canyon 2
                               ..48
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT		CHEMATIC DIAG	=			e	•
LINE	(V) RO			VERSION OR P			
NO.		NNECTOR	(<) RE	TURN OF DIVE	RTED OR PUMP	ED FLOW	
37	MM1A						
42		BW1		10 mg (10 mg)	. "		
7.		•					
47			BWZ	!			
	•			r Hartina jar			•
52	•	BW1&2.				*	
55	BW APX				* *	•	
					•	•	
58		MM1B					•
63	•	•	MM2	•			
	;	•	, , , , , ,	• •		•	
68		•		HP1A			
	•			V		•	2
73		•		RTCPA		, ,	
76	•	•			HP1B	,	-
	,	•		•	:		
81	•					HP2	
86			CPA	•	•	,•	, ,
. 00		:	CFR	· · · · · · · · · · · · · · · · · · ·		**********	ι
89			,	. нрз		•	•
•	· · · · · ·	•		•			
94		•	CPA				
97		•	;	HP4			
	•	•	•	•			
102	•	•		•	HP5		
107		•			•	HP6	
٠,	•	. •	,	•	•	V	
112		•			•	RTCPD	
115		•		•	•	•	UD54
113		: :		•	•	•	HPFA.
120		•	•	•	CPD	• • • • • • • • • • • • • • • • • • • •	
	اد	•		•	V		
123	•	• •		•	RTCPE	•	
126		• •	•	•	•	KPFB	
		• ` ` .		•	•	•	
131	•			CPÉ		••••••	
134			CD		÷		
134	•	•	СРІ	••••••			
137		• . • . •		sc1			
	,		•		* .		
142	·				SC2		•

RUN DATE 01/29/1993 TIME 22:05:10

U.S. ARMY CORPS OF ENGINEERS HYDROLOGIC ENGINEERING CENTER 609 SECOND STREET DAVIS, CALIFORNIA 95616 (916) 756-1104

FLOOD ASSESSMENT FOR RWMS JOB #:51056 FILE: RWMS10.DAT
10-YEAR 6-HOUR STORM 1.1 INCHES
POINT RAINFALL VALUE FROM NOAA ATLASS 2 VOL VII
DEPTH-AREA REDUCTION FACTORS FROM TABLE 502 IN
CLARK COUNTY HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL (CCRFCD, 1990)
CURVE NUMBERS DETERMINED USING TABLE 602 IN CCRFCD, 1990
LAG TIMES DETERMINED USING METHOD IN SECTION 606.3 IN CCRFCD, 1990
DRAINAGE AREAS FROM 7.5 MINUTE AND 15 MINUTE QUADS
THIS MODEL ADDRESSES DRAINAGES THAT COULD IMPACT THE RWMS

11 10	OUTPUT CONTROL VARIABLES IPRNT 5 IPLOT 0 QSCAL 0.	PRINT CONTROL PLOT CONTROL HYDROGRAPH PLOT SCALE				
IT.	IDATE 1 0 1TIME 0000 NQ 300 NDDATE 1 0 NDTIME 1457	MINUTES IN COMPUTATION STARTING DATE STARTING TIME NUMBER OF HYDROGRAPH OR ENDING DATE ENDING TIME CENTURY MARK				
	COMPUTATION INTERVAL TOTAL TIME BASE	.05 HOURS 14.95 HOURS			·	
	PRECIPITATION DEPTH INCH LENGTH, ELEVATION FEET FLOW CUBI STORAGE VOLUME ACRE SURFACE AREA ACRE	C FEET PER SECOND				
13 JD	INDEX STORM NO. 1 STRM 1.10	PRECIPITATION DEPTH TRANSPOSITION DRAINAGE	AREA			· · · · · · · · · · · · · · · · · · ·
14 PI	PRECIPITATION PATTERN 1.20 1.54 .36 .24 .18 .26 .54 .54 .18 .32 .30 .48 1.62 1.68 2.04 2.10 .30 .28 .96 .86 .18 .16 .06 .06	.00 .00 .0 .42 .22 .1 .54 .46 .4 .60 .80 .9 .84 .60 .4 1.80 2.88 3.4	78 1.02 00 .00 12 .36 12 .12 00 .72 18 .18 18 .25 18 .42 18 .48 18 .48 18 .48 18 .48 18 .48	.00 .44 .10 .64 .16 5.42 .60 .56 .92	.00	1.06 .96 .00 .00 .76 .84 .06 .06 .24 .12 .52 .72 6.62 7.20 .96 .96 1.12 1.32 .36 .36 .06 .00
55 JD	INDEX STORM NO. 2 STRM 1.07 TRDA 1.00	PRECIPITATION DEPTH TRANSPOSITION DRAINAGE	AREA			
O PI	.18 .26 .54 .54 .18 .32 .30 .48 1.62 1.68 2.04 2.10 .30 .28 .96 .86	.00 .00 .0 .42 .22 .2 .54 .46 .4 .60 .80 .5 .84 .60 .4 1.80 2.88 3.4 2.22 1.98 1.8 .24 .40 .4	36 .42 48 .48 78 1.20	.00 .44 .10 .64 .16 5.42 .60 .56	.00 .60 .06 .48 .12 5.46 .96 .72	1.06 .96 .00 .00 .76 .84 .06 .06 .24 .12 .52 .72 6.62 7.20 .96 .96 1.12 1.32 .36 .36
•	.18 .16 .06 .06	.12 .12 .1		.10	.18 .06	.06 .00

23 _. JD		.95 PRECIPI .99 TRANSPO	TATION DEP	TH INAGE AREA		1	•		, .
O PI	PRECIPITATION PATTE 1.20 1.54 .36 .24 .18 .26 .54 .54 .18 .32 .30 .48 1.62 1.68 2.04 2.10 .30 .28 .96 .86 .18 .16	2.22 .00 .42 .54 .60 .84 1.80 2.22 .24 .66 .12	1.26 .00 .22 .46 .80 .60 2.88 1.98 .40 .74	.78 .00 .12 .42 .90 .48 3.42 1.86 .48 .78 .12	1.02 .00 .36 .12 .72 .18 5.40 .42 .48 1.20	1.10 .00 .44 .10 .64 .16 5.42 .60 .56 .92 .10	1.26 .00 .60 .06 .12 5.46 .96 .72 .36 .18	1.06 .00 .76 .06 .24 .52 6.62 .96 1.12 .36 .06	.96 .00 .84 .06 .12 .72 7.20 .96 1.32 .36 .00
24 JD		.95 PRECIPI .01 TRANSPO	ITATION DEP DSITION DRA	TH VINAGE AREA		•			
25 PI	PRECIPITATION PATTI 1.20 1.58 .60 .56 .18 .26 .66 .62 .60 .50 .36 .36 1.32 1.82 .60 .62 .54 .48 1.80 1.62 .30 .24 .12 .10	2.34 .48 .42 .54 .30 .36 2.82 .66 .36 1.26 .12	1.62 .20 .34 .26 .64 2.42 1.06 .52 1.54 .12	1.26 .18 .30 .54 .24 .78 2.22 1.26 .60 1.68 .12	1.80 .54 .48 .36 .06 .90 2.82 1.62 .36 1.68 .12	1.88 .40 .52 .54 .18 1.00 3.26 1.30 .52 1.20 .16	2.04 .12 .60 .42 1.20 4.14 .66 .84 .24 .24	.92 .24 .60 .70 .30 1.48 4.58 .42 1.04 .24 .12	.36 .30 .60 .24 1.62 4.80 .30 1.14 .24 .06
33 JD			ITATION DEF	PTH NINAGE AREA					
O PI	PRECIPITATION PATT 1.20 1.58 .60 .56 .18 .26 .66 .62 .60 .50 .36 .36 1.32 1.82 .60 .62 .54 .48 1.80 1.62 .30 .24 .12 .10	.48 .42 .54 .30 .36 2.82 .66 .36	1.62 .28 .34 .54 .26 .64 2.42 1.06 .52 1.54 .12	1.26 .18 .30 .54 .24 .78 2.22 1.26 .60 1.68 .12	1.80 .54 .48 .36 .90 2.82 1.62 .36 1.68 .12	1.88 .40 .52 .54 .18 1.00 3.26 1.30 .52 1.20 .16	2.04 .12 .60 .90 .42 1.20 4.14 .66 .84 .24 .24	.92 .24 .60 .70 .30 1.48 4.58 .42 1.04 .24 .12	.36 .30 .60 .24 1.62 4.80 .30 1.14 .24 .06
34 JD	INDEX STORM NO. 6 STRM TRDA 30	.81 PRECIP	ITATION DEL OSITION DR	PTH AINAGE AREA	,				
O PI	PRECIPITATION PATT 1.20 1.58 .60 .56 .18 .26 .66 .62 .60 .50 .36 .36 1.32 1.82 .60 .62 .54 .48 1.80 1.62 .30 .24 .12 .10	2.34 .48 .42 .54 .30 .36 2.82 .66 .36 1.26 .12	1.62 .28 .34 .54 .26 .64 2.42 1.06 .52 1.54 .12	1.26 .18 .30 .54 .78 2.22 1.26 .60 1.68 .12 .18	1.80 .54 .48 .36 .90 2.82 1.62 .36 1.68 .12	1.88 .40 .52 .54 .18 1.00 3.26 1.30 .52 1.20 .16	2.04 .12 .60 .90 .42 1.20 4.14 .66 .84 .24 .24	.92 .24 .60 .70 .30 1.48 4.58 .42 1.04 .24 .12	.36 .30 .60 .24 1.62 4.80 .30 1.14 .24
35 JD	INDEX STORM NO. 7	.75 PRECIP	ITATION DE	Pth	•				
O PI	PRECIPITATION PATT 1.20 1.58 .60 .56 .18 .26 .66 .62 .60 .50 .36 .36 1.32 1.82 .60 .62 .54 .48 1.80 1.62 .30 .24 .12 .10	2.34 .48 .42 .54 .30 .36 2.82 .66 .36	1.62 .28 .34 .54 .26 .64 2.42 1.06 .52 1.54 .12	1.26 .18 .30 .54 .78 2.22 1.26 .60 1.68 .12 .18	1.80 .54 .48 .36 .90 2.82 1.62 .36 1.68 .12	. 10	2.04 .12 .60 .90 .42 1.20 4.14 .66 .84 .24 .24	.92 .24 .60 .70 .30 1.48 4.58 .42 1.04 .12	.36 .30 .60 .60 .24 1.62 4.80 .30 1.14 .24 .06

36	JD	INDEX	STORM NO STRM TRDA	0. 8 .66 100.00		TATION DEP			e			
·/o	P1	PRE	CIPITATIO	ON PATTERN								
_	• •		1.20	1.58	2.34	1.62	1.26	1.80	1.88	2.04	.92	.36
			.60	.56	.48	.28	.18	.54	.40	12	. 24	.30
			.18	.26	.42	.34	30	.48	.52	.60	.60	.60
			.66	.62	.54	.54	54	.36	.54	.90	.70	.60
			.60	.50	.30	.26	• 27	.06	.18	.42	.30	.24
			.36	.36	.36	.64	.78	.90	1.00	1.20	1.48	1.62
		•	1.32	1.82	2.82	2.42	2.22	2.82	3.26	4.14	4.58	4.80
									1.30			
			-60	.62	.66	1.06	1.26	1.62		.66	.42	.30
			.54	.48	.36	.52	.60	.36	.52	.84	1.04	1.14
			1.80	1.62	1.26	1.54	1.68	1.68	1.20	.24	.24	.24
		•	.30	.24	.12	.12	.12	12	.16	.24	.12	.06
			.12	.10	.06	.14	.18	.06	.08	. 12	.08	.06

. - RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

•	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FL 6-HOUR	OW FOR MAXIN	MUM PERIOD 72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
•	HYDROGRAPH AT	MM1A	50.	3.90	10.	4.	4.	.90	.*	
• .	HYDROGRAPH AT	-8W1	511.	6.55	265.	111.	111.	60.50		
+	HYDROGRAPH AT	BW2	328.	5.50	104.	42.	42.	20.80		
•	2 COMBINED AT	BW1&2	510.	6.35	268.	112.	112.	81.30		
+	2 COMBINED AT	BW APX	452.	6.40	237.	99.	99.	82.20		•
+	HYDROGRAPH AT	MM1B	43.	5.10	13.	5.	5.	2.10		
+	HYDROGRAPH AT	MM2	48.	4.10	13.	5.	5.	1.40		
+ .	HYDROGRAPH AT	HP1A	81.	4.00	18.	. 7.	7.	.80		
+	ROUTED TO	RTCPA	77.	4.45	18.	7.	7.	.80		
	HYDROGRAPH AT	HP18	28.	4.20	8.	3.	3.	1.00	•	· ·
• ·	HYDROGRAPH AT	HP2	33.	4.20	10.	4.	4.	1.20		
	4 COMBINED AT	CPA1	130.	4.35	39.	16.	16.	4.40		•
+	HYDROGRAPH AT	нрз	87.	4.20	24.	10.	10.	1.70		
•	2 COMBINED AT	CPA2	187.	4.30	56.	22.	22.	6.10		
+	HYDROGRAPH AT	нр4	88.	4,.20	26.	10.	10.	3.30		
	HYDROGRAPH AT	KP5	54.	3.90	11.	5.	 5.	1.20		•
•	HYDROGRAPH AT	HP6	77.	4.20	22.	9.	9.	2.20		
•	ROUTED TO	RTCPD	75.	4.45	22.	9.	9.	2.20		
	HYDROGRAPH AT	HPFA	9.	3.95	2.	1.	1.	.30		S. C.
•	3 COMBINED AT	CPD	90.	4.70	31.	12.	12.	3.70		
•	ROUTED TO	RTCPE	90.	5.05	31.	12.	12.	3.70		
+ ,	HYDROGRAPH AT	HPFB	35.	5.05	10.	4.	4.	1.60		
+	3 COMBINED AT	CPE	168.	5.10	53.	21.	21.	8.60		
+	2 COMBINED AT	CPF	301.	5.20	84.	34.	34.	14.70		
+	HYDROGRAPH AT	sc1	356.	6.55	184.	78.	78.	39.40		
•	HYDROGRAPH AT	sc2	32.	5.10	10.	4.	4.	1.50		
		4						**		

HEC-1 MODEL OUTPUT

FILENAME: RWMS10C.OUT

RUN DATE 01/29/1993 TIME 22:06:45

U.S. ARMY CORPS OF ENGINEERS HYDROLOGIC ENGINEERING CENTER 609 SECOND STREET DAVIS, CALIFORNIA 95616 (916) 756-1104

X			XX	XXX		х
·X	Х	X	Х	Х		XX
X	X	X	X			X
XXX	XXXX	XXXX	X	·	XXXXX	X
X	- X	Χ .	Х			X
X	Х	X ·	Х	X		X
Х	X	XXXXXXX	XX	XXX		XXX

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
ΙD
                                    FLOOD ASSESSMENT FOR RWMS JOB #:51056 FILE: RWMS10C.DAT
10-YEAR 6-HOUR STORM 1.1 INCHES
POINT RAINFALL VALUES FROM NOAA ATLAS 2 VOL VII
ADJUSTED RAINFALL PER CORRECTION FACTOR IN CLARK COUNTY MANUAL TABLE 501
DEPTH-AREA REDUCTION FACTORS FROM TABLE 502 IN
CLARK COUNTY HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL (CCRFCD, 1990)
CURVE NUMBERS DETERMINED USING TABLE 602 IN CCRFCD, 1990
LAG TIMES DETERMINED USING METHOD IN SECITON 606.3 IN CCRFCD, 1990
DRAINAGE AREAS FROM 7.5 MINUTE AND 15 MINUTE QUADS
THIS MODEL ADDRESSES DRAINAGES THAT COULD IMPACT THE RWMS
GRAM
                                     FLOOD ASSESSMENT FOR RWMS JOB #:51056
                                                                                                                                    FILE: RWMS10C.DAT
  2
                           ID
                           10
                           10
                           10
                           10
                           ID
                           ID
                           10
10
                           ID
                           *DIAGRAM
                                                                                            300
                           1 T
12
                           10
13
                           IN
                          JD 1.36 .01
* RAINFALL DISTRIBUTION FROM CLARK COUNTY MANUAL LESS THAN 10 SQ. MILES
PC 0 2 5.7 7.0 8.7 10.8 12.4 13.0 11.
PC 13.0 13.0 13.0 13.3 14.0 14.2 14.8 15.8 1
14
                                                                                                                                                           13.0
15.8
22.9
15
                                                                                                                                                                             13.0
                                                                                                                                                                                              13.0
                                                                                                                                          14.8
21.4
29.5
81.9
93.7
                                                        13.0
19.7
25.6
59.0
16
17
                                                                                                                                                                             17.2
                                                                                                                                                                                              18.1
                                                                                                                          20.4
28.3
81.2
                                                                         19.9
27.0
                          PC
PC
PC
                                                                                         20.0
27.8
74.4
                                       19.0
25.1
49.9
                                                                                                          20.1
                                                                                                                                                                             24.1
                                                                                                                                                                                              24.9
                                                                                                                                                           32.2
83.5
95.0
99.4
18
                                                                                                          28.1
                                                                                                                                                                             35.2
                                                                                                                                                                                              40.9
                                                                         71.0
87.6
98.7
19
                                                                                                          78.1
                                                                                                                                                                             85.1
                                                                                                                                                                                             85.6
                                                                                                                          92.6
99.3
20
21
22
23
24
                          PC
PC
PC
                                       86.0
98.2
99.8
                                                        86.8
                                                                                         88.8
                                                                                                          91.0
                                                                                                                                                                             97.0
                                                                                                                                                                                              97.6
                                                        98.5
99.9
                                                                                                                                           99.3
                                                                                          98.9
                                                                                                          99.0
                                                                                                                                                                                              99.8
                                                                       100.0
                            αL
                                        1.32
                                       1.17
                                                        9.99
                           JD 1.17
* CHANGED RA
                                                      INFALL DISTRIBUTION ABOVE 10 SQ. MILES PER CLARK COUNTY MANUAL
                                       1.17
                                                      10.01
                            ΔL
26
27
                                                                                                                          14.4
20.2
                          PC
                                              Ò
                                                                           5.9
                                                                                            8.0
                                                                                                          11.0
                                                                                                                                                                                             17.1
                                                                                                                                          21.0
30.5
40.8
77.9
                                                                                                                                                           22.0
30.9
43.0
79.0
                                                        18.2
                          PC
PC
PC
                                       18.0
                                                                                                          19.7
                                                                                          19.0
                                                                                                                                                                            23.0
31.0
                                                                         18.7
                                                                                                                                                                                             24.1
                                                                                                         29.0
36.1
73.1
85.9
                                                                                                                          30.0
38.1
75.2
88.9
28
29
                                                                         26.5
33.3
                                                                                         28.0
34.6
72.0
                                       25.0
32.1
                                                        25.9
32.7
                                                                                                                                                                                             31.7
                                                                                                                                                                            47.7
79.5
                                                                                                                                                                                             51.4
                                                        63.0
82.0
97.9
                                                                         71.0
82.6
3ó
                           PC
                                       56.1
81.0
                                                                                                                                                                                             80.4
31
32
33
                          PC
PC
PC
                                                                                                                                           91.0
                                                                                         84.0
                                                                                                                                                            93.8
99.2
                                                                                                                                                                             96.6
99.3
                                                                                                                                                                                             97.0
                                       97.4
99.7
                                                                                         98.3
                                                                         98.1
                                                                                                          98.5
                                                                                                                          98.9
                                                                                                                                                                                             99.6
                                                        99.9
                                                                       100.0
34
                                        1.07
                                                            20
                            JD
                                       1.01
35
                                                            30
                            JD
36
                            JD
                                                            50
37
                                          .82
                                                           100
                           JD
38
                                       MM1A
                           KK
39
                           KM
                                      Basin runoff calculation for Mass. Mountains 1A
40
                           BA
                           LS
                                                            80
42
                           UD
                                          .31
                                          Basin runoff calculation for Barren Wash 1
45
                           BA
                                       60.5
46
                           UD
                                          2.1
```

```
48
49
50
51
52
                KK
                        BW2
                        Basin runoff calculation for Barren Wash 2
                KM
                       20.8
                BA
                LS
                                   80
                         .9
                UD
53
                      BW1&2
                KK
                      Combined BW1 and BW2
54
55
                KM
HC
56
                      Combine BW1, BW2, and MM1A (assume dischaarge of Barren Wash "active apex")
                KM
HC
57
58
 59
                KK
                     Basin runoff calulation for Mass. Mountains 1B Flow was not combined with BW APX because flow from this watershed
                KM
*
 60
                     will not directly impact RWMS wereas a channel migration at the apex could impact the RWMS
                        2.1
 62
63
                LS
                         .48
                UD
                        MM2
                KM
                       Basin runoff calculation for Mass. Mountains 2
 65
                BA
 66
67
                        1.4
                LS
                        .47
 68
                UD
 69
70
                KK
KM
                       HP1A
                       Basin runoff calculation for Half Pint Range 1A
 71
72
73
                BA
                         .8
                LS
                        .48
                UD
 74
75
76
                      RTCPA
                      Route Flow from HP1A to CPA 9 .43 .2
                KΜ
                RM
 77
78
79
                       Basin
                              runoff'calculation for Half Pint Range 18
                        1.0
                LS
                UD
                        .51
 82
                KK
KM
 83
                       Basin runoff calculation for Half Pint Range 2
 84
                       1.2
 85
                LS
                        .51
 86
                UD
 87
 88
                KM
                       Combine MM2, routed HP1A, HP1B, HP2
 89
                HC
 90
                         (CPB) Basin runoff calculation for Half Pint Range 3
 92
                ВА
                         1.7
                LS
                                   82
                UD
                         .59
                       Combine HP3 with flow from CPA1
                HC
 98
                KK
 99
                         (CPC) Basin runoff calculation for Half Pint Range 4
100
                        3.3
101
                LS
102
                         .52
                UD
103
104
                KM
                         Basin runoff calculation for Half Pint Range 5
105
106
                LS
107
                UĐ
                          .3
108
                KK
                        HP6
109
                KM
                         Basin runoff calculation for Half Pint Range 6
                BA
110
                        2.2
                LS
111
                                   80
112
                UD
                         .55
113
114
115
                KK
KM
                      RTCPD
                       Route HP6 to CPD 5 .27
```

```
KK
KM
BA
LS
UD
                             HPFA
                              Basin runoff calculation for Half Pint Range FA
116
117
118
119
120
                               .33
121
122
123
                    KK
KM
HC
                               CPD
                               Combine HP5, routed HP6, and HPFA
124
125
126
                    KK
                            RTCPE
                    KM
RM
                              Route flow from CPD to CPE
8 .39 .2
127
128
129
130
131
                    KK
                             HPFB
                              Basin runoff calculation for Half Pint Range FB
                    KM
                    BA
                               1.6
                    LS
                               .44
132
133
134
                    KK
KM
HC
                             Combine HP4 (CPC) with routed flow from CPD, and HPFB 3
135
136
137
                    KK
KM
HC
                             Combine all flow at Concentration just below RWMS (Flow from CPA & CPE) 2
138
139
                    KM Basin runoff calculation for Scarp Canyon 1
* Concentration Pt of this watershed is the active apex of the Scarp Canyon Fan
140
141
142
                    BA
LS
UD
                              39.4
                               2.1
143
144
145
146
147
148
                    KK
KM
BA
LS
UD
ZZ
                               Basin runoff calculation for Scarp Canyon 2
                               .48
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

****	SCHEMATIC DIA	GRAM OF STREAM NETWORK	
INPUT	(V) ROUTING	(>) DIVERSION OR	PUMP FLOW
ŅO.	(.) CONNECTOR	(<) RETURN OF DIV	PRITED OR PUMPED FLOW
38	MM1A		
-	•		,
43	. BW1		
	•		
48	•	BW2	
53	. Bw182	•	
,,	·	• • • • • • • • • • • • • • • • • • • •	
56	BW APX		
	•		
59	. MM18		
	•		
. 64	•	MM2	
69	•	. HP	14
. 07	•	• . nr	V
74		RTC	V PA
	•	•	.•
77		•	. HP18
	•	•	•
82 、	•	•	. HP2
97	•	COAT	
87 ,		CPA1	••••••
90	•	. HI	P3
	•	•	•
95	•	CPA2	•••
	•	•	
98	•	. " " HI	P4
407		•	
103	•	•	. HP5
108	•	•	. HP6
	•	•	·
- 113	•		RTCPD
		•	•
116	•	•	. HPFA
121	•	•	CDD
121	•	, ,	. CPD
124	•	• • •	RTCPE
	•	•	
127	•		HPFB
	•		: :
132		C	PE
135	•	CDE	•
133	•	. CPF	••
138	•	S	c1
	•	•	•
143	•		sc2
	•		· · · · · · · · · · · · · · · · · · ·

RUN DATE 01/29/1993 TIME 22:06:45

U.S. ARMY CORPS OF ENGINEERS HYDROLOGIC ENGINEERING CENTER 609 SECOND STREET DAVIS, CALIFORNIA 95616 (916) 756-1104

FLOOD ASSESSMENT FOR RWMS JOB #:51056 FILE: RWMS10C.DAT
-10-YEAR 6-HOUR STORM 1.1 INCHES
POINT RAINFALL VALUES FROM NOAA ATLAS 2 VOL VII
ADJUSTED RAINFALL PER CORRECTION FACTOR IN CLARK COUNTY MANUAL TABLE 501
DEPTH-AREA REDUCTION FACTORS FROM TABLE 502 IN
CLARK COUNTY HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL (CCRFCD, 1990)
CURVE NUMBERS DETERMINED USING TABLE 602 IN CCRFCD, 1990
LAG TIMES DETERMINED USING METHOD IN SECITON 606.3 IN CCRFCD, 1990
DRAINAGE AREAS FROM 7.5 MINUTE AND 15 MINUTE QUADS
THIS MODEL ADDRESSES DRAINAGES THAT COULD IMPACT THE RWMS

	INIS MODE	F WOOKE225 OK	AINAGES I	HAT COOLD	IMPACI THE	KMM2			
12 10	OUTPUT CONTROL VARI IPRNT IPLOT QSCAL	5 PRINT CO		CALE			•		
		* 1		-		•"			
IΤ	HYDROGRAPH TIME DAT NMIN IDATE 1 ITIME NQ	A 3 MINUTES 0 STARTING 0000 STARTING 300 NUMBER C	DATE TIME	. ,	,			•	•
	NDDATE 1 NDTIME ICENT	0 ENDING 0 1457 ENDING 1 19 CENTURY	IME						•
	COMPUTATION INTER TOTAL TIME B		OURS OURS		•		,		
	ENGLISH UNITS DRAINAGE AREA PRECIPITATION DEPTH LENGTH, ELEVATION FLOW	SOUARE MILES INCHES FEET CUBIC FEET PE	R SECOND						
	STORAGE VOLUME SURFACE AREA TEMPERATURE	ACRE-FEET ACRES DEGREES FAHRE							2
14 JD		1.36 PRECIPIT	TATION DEP		*.			.*	ſ
15 PI	PRECIPITATION PAT				:				
	1.20 1.54		1.26 .00	.78 .00	1.02 .00	1.10		1.06	.96
	.36 .24 .18 .26		.22	12	.36	.00 .44	.00 .60	.00 .76	.00
	.54 .54 .18 .32	. 54	.46	.42	.12 .72	.10	.06	.06	.06
	.30 .48		.60	.48	.18	.16	.12	.52	.72
	1.62 1.68	1.80	2.88	3.42			5.46	6.62	7.20
	2.04 2.10 .30 .28	.24	1.98 .40	1.86 .48	.42 .48	.60 .56	.96 .72	.96 1.12	.96 1.32
	· .96 .86	.66	.74	.78	1.20	.92	.36	.36	.36
•	.18 .16 .06 .06		.12	.12 .18	.06	.10 .02	.18 <.06	.06 .06	.00
23 JD	INDEX STORM NO. 2 STRM TRDA	1.32 PRECIPI 1.00 TRANSPOS			•				
14 O	PRECIPITATION PAT								
	1.20 1.54 .36 .24	.00	1.26 .00	.78 .00	1.02	1.10 .00	1.26 .00	1.06	.96 .00
	.18 .26 .54 .54	.42	.22 .46	.12 .42	.36 .12	.44	.60 .06	.76 .06	.84 .06
	.18 .32	.60	.80	.90	.72	.64	.48	.24	.12
	.30 .48		.60	.48	.18	.16 5.42	. 12	.52	.72
	1.62 1.68 2.04 2.10		2.88 1.98	3.42 1.86	5.40 .42	5.42 .60	5.46 .96	6.62 .96	7.20 .96
	.30 .28		.40	.48	.48	.56	.72	1.12	1.32
	.96 .86	.66	.74	.78	1.20	.92	36	.36	.36
·	.18 .16 .06 .06		.12	.12 .18	.06	.10 .02	.18 .06	.06 .06	.00
							•		1

*											
•				•							
24 JD		INDEX STORM NO STRM TRDA	1.17		TATION DEP SITION DRA	TH INAGE AREA			•. •		
O PI		PRECIPITATIO 1.20 .36 .18 .54 .18 .30 1.62 2.04	1.54 .24 .26 .54	2.22 .00 .42 .54 .60 .84 1.80 2.22	.46	.78 .00 .12 .42 .90 .48 3.42	1.02 .00 .36 .12 .72 .18 5.40 .42 .48 1.20	.00 .44 .10 .64	1.26 .00 .60 .06 .48 .12 5.46	1.06 .00 .76 .06 .24 .52 6.62	.96 .00 .84 .06 .12 .72 7.20
		.30 .96 .18	.28 .86 .16	.24 .66 .12	.40 .74 .12 .14	.48 .78 .12	.48 1.20 .06 .00	.60 .56 .92 .10	.72 .36 .18	.96 1.12 .36 .06	.96 1.32 .36 .00
25 JD		INDEX STORM NO STRM TRDA	. 4 1.17 10.01	PRECIPI TRANSPO	TATION DEP	TH INAGE AREA		• •			
26 PI		PRECIPITATIO 1.20 .60 .18 .66 .60 .36 1.32 .60 .54 1.80 .30 .12	1.58 .56 .26 .62	.54 .30 .36 2.82 .66	1.62 .28 .34 .54 .26 .64 2.42 1.06 .52 1.54 .12	.30 .54	1.80 .54 .48 .36 .90 2.82 1.62 .36 1.68 .12	1.88 .40 .52 .54 .18 1.00 3.26 1.30 .52 1.20 .16	2.04 .12 .60 .90 .42 1.20 4.14 .66 .84 .24 .12	.24	.36 .30 .60 .24 1.62 4.80 .30 1.14 .24
34 JD		INDEX STORM NO STRM TRDA	1.07 20.00	PRECIPI TRANSPO	TATION DEP	TH INAGE AREA		•		•	
O PI		PRECIPITATIO 1.20 .60 .18 .66 .60 .36 1.32 .60 .54 1.80 .30	1.58 .56 .26 .62 .50 .36	2.34 .48 .42 .54 .30 .36 2.82		1.26 .18 .30 .54 .24 .78 2.22 1.26 .60 1.68 .12 .18	1.80	1.88 .40 .52 .54 .18 1.00 3.26 1.30 .52 1.20	2.04 .12 .60 .90 .42 1.20 4.14 .66 .84 .24 .24	.92 .24 .60 .70 .30 1.48 4.58 .42 1.04 .24 .12	.36 .30 .60 .60 .24 1.62 4.80 .30 1.14 .24 .06
35 JD	•	INDEX STORM NO STRM TRDA	1.01	PRECIPI TRANSPO	TATION DEP DSITION DRA	TH VINAGE AREA			•		
O PI		PRECIPITATIO 1.20 .60 .18 .66 .60 .36 1.32 .60 .54 1.80 .30 .12	DN PATTERN 1.58 .56 .62 .50 .36 1.82 .62 .48 1.62 .24	2.34 .48 .42 .54 .30 .36 2.82 .66 .36 1.26	1.62 .28 .34 .54 .26 .64 2.42 1.06 .52 1.54 .12	1.26 .18 .30 .54 .24 .78 2.22 1.26 .60 1.68 .12 .18	1.80 .54 .48 .36 .90 2.82 1.62 .36 1.68 .12		2.04 .12 .60 .90 .42 1.20 4.14 .66 .84 .24 .24	.92 .24 .60 .70 .30 1.48 4.58 .42 1.04 .24 .12	.36 .30 .60 .24 1.62 4.80 .30 1.14 .24 .06
36 JD		INDEX STORM NO STRM TRDA). 7 .92	PRECIPI	TATION DEF						
O PI		PRECIPITATIO 1.20 .60 .18 .66 .60 .36 1.32 .60 .54 1.80 .30 .12	DN PATTERN 1.58 .56 .26 .50 .36 1.82 .62 .48 1.62 .24 .10	2.34 .48 .42 .54 .30 .36 2.82 .66 1.26 .12	.28 .34 .54 .26 .64	1.26 .18 .30 .54 .24 .78 2.22 1.26 .60 1.68 .12 .18	1.80 .54 .48 .36 .06 .90 2.82 1.62 .36 1.68 .12	.40	2.04 .12 .60 .90 .42 1.20 4.14 .66 .84 .24 .24	.92 .24 .60 .70 .30 1.48 4.58 .42 1.04 .12	.36 .30 .60 .60 .24 1.62 4.80 .30 1.14 .24 .06

37 JD	INDEX	STORM NO STRM TRDA	. 8 .82 100.00		TATION DEF	TH LINAGE AREA		· .	:	, .	
, O PI	PRE	CIPITATIO 1.20 .60 .18 .66 .60	1.58 .56 .26 .62 .50	2.34 .48 .42 .54 .30	1.62 .28 .34 .54 .26	1.26 .18 .30 .54 .24	1.80 .54 .48 .36 .06	1.88 .40 .52 .54 .18 1.00	2.04 .12 .60 .90 .42 1.20	.92 .24 .60 .70 .30 1.48 4.58	.36 .30 .60 .60 .24
		1.32 .60 .54 1.80 .30	1.82 .62 .48 1.62 .24 .10	2.82 .66 .36 1.26 .12	2.42 1.06 .52 1.54 .12 .14	2.22 1.26 .60 1.68 .12 .18	2.82 1.62 .36 1.68 .12 .06	3.26 1.30 .52 1.20 .16 .08	.66 .84 .24 .24	4.56 .42 1.04 .24 .12 .08	4.80 .30 1.14 .24 .06

RUNOFF SUMMARY FLOW IN CUBIC FEET PER SECOND TIME IN HOURS, AREA IN SQUARE MILES

TIME OF MAX STAGE

•	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLO	OW FOR MAXIMU	JM PERIOD 72-HOUR	BASIN AREA	MAXIMU STAGE
•	HYDROGRAPH AT	MM1A	108.	3.85	20.	8.	8.	.90	
•	HYDROGRAPH AT	BW1	1083.	6.40	574.	242.	242.	60.50	
•	HYDROGRAPH AT	BW2	653.	5.45	232.	93.	93.	20.80	
•	2 COMBINED AT	BW1&2	1083.	6.10	581.	244.	244.	81.30	
• ·	2 COMBINED AT	BW APX	1078.	6.10	581.	244.	244.	82.20	
•	HYDROGRAPH AT	мм1в	110.	4.10	28.	11.	. 11.	2.10	
+	HYDROGRAPH AT	MM2	110.	4.05	26.	10. /	10.	1.40	. ,
•	HYDROGRAPH AT	HP1A	139.	4.00	30.	12.	. 12.	.80	
•	ROUTED TO	RTCPA	132.	4.40	30.	12.	12.	.80	•
•	HYDROGRAPH AT	HP1B	68.	4.10	17.	7.	7.	1.00	
•	HYDROGRAPH AT	HP2	79.	4.10	20.	8.	8.	1.20	
.+	4 COMBINED AT	CPA1	278.	4.25	76.	31.	31.	4.40	
, +	HYDROGRAPH AT	нР3	170.	4.15	43.	17.	17.	1.70	- '
•	2 COMBINED AT	CPA2	399.	4.20	108.	43.	43.	6.10	
•	HYDROGRAPH AT	нР4	210:	4.10	54.	21.	21.	3.30	
•	HYDROGRAPH AT	HP5	123.	3.85	23.	9.	9.	1.20	
•	HYDROGRAPH AT	HP6	168.	4.10	43.	17.	17.	2.20	
. •	ROUTED TO	RTCPD	164.	4.40	43.	17.	17.	2.20	
+	HYDROGRAPH AT	HPFA	23.	3.90	5.	2.	2.	.30	
.*	3 COMBINED AT	CPD	199.	4.30	62.	25.	25.	3.70	
•	HYDROGRAPH AT	RTCPE	196.	4.70	62.	25.	25.	3.70	
+ .	3 COMBINED AT	HPFB	93.	4.05	23.	9.	9.	1.60	
•	2 COMBINED AT	CPE	335.	4.25	116.	46.	46.	8.60	
+	HYDROGRAPH AT	CPF	576.	5.20	182.	73.	73.	14.70	•
•		SC1	769.	6.40	408.	172.	172.	39.40	
+	HYDROGRAPH AT	sc2	84.	4.10.	21.	9.	9.	1.50	

HEC-1 MODEL OUTPUT

FILENAME: RWMS2.OUT

(2-YEAR MODEL)

RUN DATE 01/29/1993 TIME 22:08:57

U.S. ARMY CORPS OF ENGINEERS
HYDROLOGIC ENGINEERING CENTER
609 SECOND STREET
DAVIS, CALIFORNIA 95616
(916) 756-1104

¥	×	XXXXXXX	XXX	XX		x
ŵ	x	X	X	X		XX
x	X	X	X	•••		X
XXX	XXXX	XXXX	X		XXXXX	X
- X	Х	X	X			X
X	X	Χ ,	X	X		X
X	X	XXXXXXX	XXXXX			XXX

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

							~					
1		10	FLOOD	ASSESSME	NT FOR RW	MS JOB	#:51056		ILE: RWM	S2.DAT		
Ž		ID		R 6-HOUR				•				
				RAINFALL				T	HICTHENT	HECECCA	nu.	
3		ID							JO2 I WEN I	NECE 224	KT)	
4		ID	DEPTH-	AREA REDI	JCTION FA	CTORS F	ROM TABLI	E 502 IN				
5		ID	CLARK	COUNTY H	YDROLOGIC	CRITER	IA AND D	RAINAGE D	ESIGN MA	NUAL (CC	FRCD. 19	90)
.6		iĎ	CLIDAE	NUMBERS I	ETERMINE	D HETMO	TADIE 6	02 IN CCE	PCD 100	n (00		,
			CORVE	NUPIDENS I	PLICKHINE	7 10 MEZ	I INDEE O	CCTION (C	(7 11 0	V 05000 4	~~~	
7		10		MES DETE						CFRCD, 1	YYU .	
8		ID		AGE AREAS								
9		10	THIS	HODEL ADDI	RESSES DR	AINAGES	THAT CO	ULD IMPAC	T THE RW	MS		
•			AGRAM									
10	,		3	. 0	0	300						
		IT		U	, 0	300		*				
11		10	5									
12	•	IN	· 5				•					
13		JD.	0.7	.01				•		•		
				DISTRIBU	-	CLADY	COLINTÝ M	AMHAL LEG	C TUAN 1	0 co M1	l Ee	
4.												45.4
14		PC	0	2	5.7	7.0	8.7	10.8	12.4	13.0	13.0	13.0
15		PC	13.0	13.0	13.0	13.3	14.0	14.2	14.8	15.8	17.2	18.1
16		PC	19.0	19.7	19.9	20.0	20.1	20.4	21.4	22.9	24.1	24.9
17		PC	25.1	25.6	27.0	27.8	28.1	28.3	29.5	32.2	35.2	40.9
								81.2				
18		PC	49.9	59.0	71.0	74.4	78.1		81.9	83.5	85.1	85.6
19		PC	86.0	86.8	87.6	88.8	91.0	92.6	93.7	95.0	97.0	97.6
20		PC	98.2	98.5	98.7	98.9	99.0	99.3	. 99.3	99.4	99.5	99.8
21		PC	99.8	99.9	100.0							
22	100	JD	.68	1						200		
23		JD	.60	9.99					· .			
		* (RAINFALL !	DISTRIBUT	ION ABO	VE 10 SQ	. MILES P	ER CLARK	COUNTY	MANUAL	
24		· JD	.60	10.01								
25		PC	0	2.0	5.9	8.0	11.0	14.4	15.0	16.0	16.8	17.1
26		PC	18.0	18.2	18.7	19.0	19.7	20.2	21.0	22.0	23.0	24.1
22	,											
27		PC	25.0	25.9	26.5	28.0	29.0	30.0	30.5	30.9	31.0	31.7
28		PC	32.1	32.7	33.3	34.6	36.1	38.1	40.8	43.0	47.7	51.4
29		PC	56.1	63.0	71.0	72.0	73.1	75.2	77.9	79.0	79.5	80.4
30		PC	81.0	82.0	82.6	84.0	85.9	88.9	91.0	93.8	96.6	97.0
31		PC	97.4	97.9	98.1	98.3	98.5	98.9	99.0	99.2	99.3	
						, 90.3	70.5	70.7	77.0	77.2	77.3	99.6
32		PC	99.7	99.9	100.0		* .					
33		JD	.55	20								
34		JD	.52	30								
35		JD	.48	50	•							
36		JD	.42	100								
30		30	.42	100								
					:		,	•				
37		KK	MM1A									
38		KM	Basin	runoff c	alculatio	n for M	lass. Mou	ntains 1A				
39		BA	.9									
40			.,	90								
		LS		80								
41	-	UD	.31	٠.	•							
•		•				*				1 1		
42		KK	BW1		•			•				
43				in runoff	مماريم ا مم	ion for	. Danaa 1	Jook 4				
		KM		in runott	cattutat	TOUTION	eartien i	wash I.			•	
44		BA	60.5			* * *					٠.	
45		LS		83			•	•				
46		ÜĎ	2.1		•							

```
KK
KM
BA
LS
47
48
49
50
51
                       BW2
                       Basin runoff calculation for Barren Wash 2
                      20.8
               ŨĎ
52
53
54
               KK
                     BW1&2
               KM
                     Combined BW1 and BW2
               HC
55
56
57
               KK
               KM
HC
                     Combine BW1, BW2, and MM1A (assume dischaarge of Barren Wash "active apex")
58
               KK
59
               KM
                    "Basin runoff calulation for Mass. Mountains 1B
                    Flow was not combined with BW APX because flow from this watershed
                    will not directly impact RWMS wereas a channel migration at the apex
                    could impact the RWMS
60
               BA
                       2.1
61
62
               LS
               UD
                        .48
63
64
65
66
67
               KK
                       MM2
                      Basin runoff calculation for Mass. Mountains 2
               KM
               BALS
                       1.4
               UD
                        .47
               KK
                      HP1A
68
69
70
71
72
               KM.
                      Basin runoff calculation for Half Pint Range 1A
               BA
LS
UD
                        .8
                        .48
73
74
75
                     RTCPA
               KK
               KM
RM
                     Route Flow from HP1A to CPA
76
77
78
79
80
               KK
                      HP18
               KM
                      Basin runoff calculation for Half Pint Range 1B
               BA
                       1.0
               LS
                                  78
                        .51
               UD
 81
               KK
                       HP2
82
83
                KM
                      Basin runoff calculation for Half Pint Range 2
               BA
LS
                       1.2
84
85
                                  78
                        .51
               UD
               KK
                       CPA1
               KM
HC
                       Combine MM2, routed HP1A, HP1B, HP2
 87
 88
 89
               KK
                        (CPB) Basin runoff calculation for Half Pint Range 3 1.7
 90
91
92
                KM
               BA
                                  82
                LS
                        .59
 93
                UD
               KK
KM
 94
                       CPA2
 95
96
                       Combine HP3 with flow from CPA1
                HC
 97
98
99
                        (CPC) Basin runoff calculation for Half Pint Range 4 3.3
                KK
                KM
                BA
                                  79
100
                LS
                        .52
101
               UD
102
                KK
                        HP5
103
                KM
                        Basin runoff calculation for Half Pint Range 5
104
105
                ВА
                        1.2
                                  79
                LS
                         .3
106
                UD
107
                KK
                        HP6
108
                KM
                        Basin runoff calculation for Half Pint Range 6
109
                BA
                        2.2
                                  80
110
                LS
                        .55
111
                UD
                KK
                     RTCPD
113
114
                      Route HP6 to CPD
```

```
115
116
117
118
                            HPFA
                   KK
KM
BA
LS
UD
                             Basin runoff calculation for Half Pint Range FA
                              ,33
119
                   KK
KM
KC
120
121
122
                             CPD
                             Combine HP5, routed HP6, and HPFA
123
124
125
                    ΚK
                          RTCPE
                              Route flow from CPD to CPE 8 .39 .2
                   KM
RM
126
127
128
129
130
                    KK
KM
BA
LS
UD
                              Basin runoff calculation for Half Pint Range FB
                              1.6
                              .44
131
132
133
                    KK
KM
                            Combine HP4 (CPC) with routed flow from CPD, and HPFB 3
134
135
136
                            Combine all flow at Concentration just below RWMS (Flow from CPA & CPE)
137
138
                    KM Basin runoff calculation for Scarp Canyon 1
* Concentration Pt of this watershed is the active apex of the Scarp Canyon Fan
BA 39.4
                    BA
LS
UD
140
141
                              2.1
142
143
144
145
146
147
                    KK
KM
BA
LS
UD
2Z
                              Basin runoff calculation for Scarp Canyon 2
                              .48
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	`. (V) ROL	UTING	•	VERSION OR P	UMP FLOW		
NO.	(.) COI	NNECTOR	(<) RE	TURN OF DIVE	RTED OR PUMP	ED FLOW	
37	MM1A						
	•						
42	:	BW1	•.			,	
	•	•				•	
47	•	•	BW2		•		
52		BW1&2.	•				
	•	•					*
55	BW APX	• • • • • • • • • • • • • • • • • • • •				•	
	•						
58	•	MM1B		•			
63	•	•	MM2				
0,5		•	•				
68		•	•	HP1A			
	•	•	•	V	• •		
73	•		•	RTCPA			
76		•		•	· КР18		
10	•	•	•	•	. nr 10		
- 81	,	•	•	•	•	HP2	
•	•					•	
86	•		CPA1	••••••••			. %
	:		<i>y</i> *	un7		•	
89	•		•	нр3	,		
94	: .:	•	CPAZ				
•	•		. •				
97	:			KP4			
	•		•	•		•	
102				•	HP5		*
107	•			•	•	HP6	
	•	•				. Y	• • • • • • • • • • • • • • • • • • • •
112			-45			RTCPD	
	•	•		•		•	
115	•	•	•	•	•	•	HPFA
120	•				CPD	•	•
			•		V		
123	•		•	•	RTCPE		
	•	•		•	•		
126			•		•	HPFB	
131	•	•	. •	CPE		• .	
.51	•		•	·	· · · · · · · · · · · · · · · · · · ·		•
134	•		СР	•	•	•	
•				•	•	•	
137	•			sc1			
1/2		•		•			
142	•	•	·•	•	sc2		
(***)	RUNOFF ALSO	COMPUTED AT	THIS LOCATI	ON	,		·

RUN DATE 01/29/1993 TIME 22:08:57

U.S. ARMY CORPS OF ENGINEERS
HYDROLOGIC ENGINEERING CENTER
609 SECOND STREET
DAVIS, CALIFORNIA 95616
(916) 756-1104

FLOOD ASSESSMENT FOR RWMS JOB #:51056 FILE: RWMS2.DAT
2-YEAR 6-HOUR STORM 0.7 INCHES
POINT RAINFALL FROM NOAA ATLAS 2 VOL VII (NO ADJUSTMENT NECESSARY)
DEPTH-AREA REDUCTION FACTORS FROM TABLE 502 IN
CLARK COUNTY HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL (CCFRCD, 1990)
CURVE NUMBERS DETERMINED USING TABLE 602 IN CCFRCD, 1990
LAG TIMES DETERMINED USING METHOD IN SECTION 606.3 IN CCFRCD, 1990
DRAINAGE AREAS FROM 7.5 MINUTE AND 15 MINUTE QUADS
THIS MODEL ADDRESSES DRAINAGES THAT COULD IMPACT THE RWMS

44		OUT OUT						100			
11	10	11		PRINT CONTR							, .
,				PLOT CONTRO HYDROGRAPH				•			
•	11	HVDDOCD	APH TIME DATA						•		
	11	- I	NMIN 3	MINUTES IN	COMPUTATION	N INTERVAL	•	•	:	•	•
			DATE 1 0 TIME 0000	STARTING DA	NE IF			1.0			
		•	NQ 300			ORDINATES					
			DATE 1 0	ENDING DATE							
			TIME 1457	' ENDING TIME CENTURY MAR	,				**		
		10	ENT 19	CENTURI MAR							
			TATION INTERVAL								
	1	1	TOTAL TIME BASE	14.95 HOURS				•			
		ENGLISH UNITS		-							
		DRAINAGE	AREA SQU	ARE MILES		٠.					
			TION DEPTH INC	HES					·		
			LEVATION FEE								
		FLOW STORAGE V		IC FEET PER SI E-FEET	ECOND			•			
	•	SURFACE A	REA ACR			.*	•				
		TEMPERATU		REES FAHRENHE	IT .						
13	JD	INDEX 6	TORM NO. 1								
1.5	JU			PRECIPITATIO	ON DEPTH		. •				
				TRANSPOSITI		E AREA					
.1/	ΡI	DOCCI	PITATION PATTERN								
14	P 1	1.		2.22 1	.26	.78 1	.02 1.	10 1	.26	1.06	.96
٠.		•	36 .24	.00	.00	.00	.00	00	.00	.00	.00
			18 .26	.42	.22	.12	7/		<i>,</i> ~	.76	.84
	t	•	54 .54		.46	.42	. 12	10	.06	.06	-06
		•	18 .32 30 .48	.60 .84	. 46 . 80 . 60	.90 .48	.72 .0	04 16	.12	.24 .52	.12
		1.	62 1.68	1.80 2	.88 3.	.42 5	40 5.4		.46	6.62	7.20
		2.	04 2.10	2.22 1	.98` 1.	.86	.42	60	.40 .96 72	.96	.96
			30 .28 96 .86	.24 .66	.40 .74	.48 .78 1.	.48 .20	56	.72	1.12	1.32
			18 .16		.12	.12	.20 .	92 10		.36 .06	.36 .00
			06 .06	.06	.14	.18	.00 .	10	.06	.06	.06
. 22	ın	THOSY C	TODU 410 3								
			TORM NO. 2 STRM .68	PRECIPITATI	ON DEPTH						
			TRDA 1.00			E AREA		•	•	•	
^	PI					• • •					
U	PI	PRECI	PITATION PATTERN 20 1.54		.26	.78 1.	.02 1.	10 1	24	1.06	.96
			36 26	.00	.00	.00	.00 .1	00	.00	.00	.00
			18 .26	.42	.22 ` .	.12 .	.36 .	44 .	.60	.76	.84
			J4 .J4	.54	.46	. 47	.12	10	.06	.06	-06
			18 .32 30 .48	.60 .84	.80 .60	.90 .48	.72 .0	54	.48	.24 .52	.12
		1.	62 1.68	1.80 2	.88 3.		.40 5.4	52 5	.12 .46		.72 7.20
		2.0	04 2.10	2.22 1	.98 1.	.86	.42	50	.96	.96	.96
			30 .28	.24	.40 .	.48 .	.48	50 56	.72	1.12	1.32
			96 .86	.66	.74 .	.78 1.	.20 .9	72 .	.36	.36	.36
			18 .16 06 .06	.12 .06	. 12 . 14		.06 .00	10	.18 .06	.06 .06	.00 .06
				.00	• • •			-		.00	•00

23 JD	INDEX STORM NO. 3 STRM .60 TRDA 9.99	PRECIPITATION DEPTH TRANSPOSITION DRAINAGE AREA			
0 PI	PRECIPITATION PATTERN 1.20 1.54 .36 .24 .18 .26 .54 .54 .18 .32 .30 .48 1.62 1.68 2.04 2.10 .30 .28 .96 .86 .18 .16 .06 .06	.54 .46 .42 .60 .80 .90 .84 60 .48	1.02 1.10 .00 .00 .36 .44 .12 .10 .72 .64 .18 .16 5.40 5.42 .42 .60 .48 .56 1.20 .92 .06 .10	1.26 1.06 .00 .00 .60 .76 .06 .06 .48 .24 .12 .52 5.46 6.62 .96 .96 .72 1.12 .36 .36 .18 .06 .06	.96 .00 .84 .12 .72 7.20 .96 1.32 .36 .00
24 JD	INDEX STORM NO. 4 STRM .60 TRDA 10.01	PRECIPITATION DEPTH TRANSPOSITION DRAINAGE AREA			
25 PI	.60 .50 .36 .36 1.32 1.82 .60 .62 .54 .48	TRANSPOSITION DRAINAGE AREA 2.34	1.80 1.88 .54 .40 .48 .52 .36 .54 .06 .18 .90 1.00 2.82 3.26 1.62 1.30 .36 .52 1.68 1.20 .12 .16 .06 .08	2.04 .92 .12 .24 .60 .60 .90 .70 .42 .30 1.20 1.48 4.14 4.58 .66 .42 .84 1.04 .24 .24 .24 .12	.36 .30 .60 .24 1.62 4.80 .30 1.14 .24 .06
33 JD	INDEX STORM NO. 5 STRM .55 TRDA 20.00	PRECIPITATION DEPTH TRANSPOSITION DRAINAGE AREA			
0 PI	.36 .36 1.32 1.82 .60 .62 .54 .48 1.80 1.62 .30 .24	.48 .28 .18 .42 .34 .30 .54 .54 .54 .30 .26 .24 .36 .64 .78 2.82 2.42 2.22 .66 1.06 1.26 .36 .52 .60 1.26 1.54 1.68	1.62 1.30 .36 .52	2.04 .92 .12 .24 .60 .60 .90 .70 .42 .30 1.20 1.48 4.14 4.58 .66 .42 .84 1.04 .24 .24 .24 .12	.36 .30 .60 .24 1.62 4.80 .30 1.14 .24 .06
34 JD	INDEX STORM NO. 6 STRM .52 TRDA 30.00	PRECIPITATION DEPTH TRANSPOSITION DRAINAGE AREA		./	
O PI	PRECIPITATION PATTERN 1.20 1.58 .60 .56 .18 .26 .66 .62 .60 .50 .36 .36 1.32 1.82 .60 .62 .54 .48 1.80 1.62 .30 .24 .12 .10		1.80	2.04 .92 .12 .24 .60 .60 .90 .70 .42 .30 1.20 1.48 4.14 4.58 .66 .42 .84 1.04 .24 .24 .24 .24 .21 .08	.36 .30 .60 .24 1.62 4.80 .30 1.14 .24
35 JD	INDEX STORM NO. 7 STRM .48	PRECIPITATION DEPTH TRANSPOSITION DRAINAGE AREA			
O PI		2.34 1.62 1.26 .48 .28 .18 .42 .34 .30 .54 .54 .54 .30 .26 .24 .36 .64 .78 2.82 2.42 2.22 .66 1.06 1.26 .36 .52 .60 1.26 1.54 1.68	1.80	2.04 .92 .12 .24 .60 .60 .90 .70 .42 .30 1.20 1.48 4.14 4.58 .66 .42 .84 1.04 .24 .24 .24 .12	.36 .30 .60 .24 1.62 4.80 .30 1.14 .24 .06

36 JD	INDEX STORM STRM TRDA			ITATION DEP OSITION DRA						. •
O PI	PRECIPITA									
	1.20	1.58	2.34	1.62	1.26	1.80	1.88	2.04	.92	.36
	.60	.56	. 48	.28	. <u>1</u> 8	.54	.40	.12	.24	.30
	.18	.26	.42	.34	30	.48	.52	.60	.60	60
*	.66	.62	.54	.54	.54	.36	.54	.90	.70	.60
•	.60	.50	.30	.26	.24	.06	.18	.42	.30	.24
	.36	.36	.36	.64	.78	.90	1.00	1.20	1.48	1.62
	1.32	1.82	2.82	2.42	2.22	2.82	3.26	4.14	4.58	4.80
* .	.60	.62	.66	1.06	1.26	1.62	1.30	.66	.42	.30
	.54	.48	36	.52	.60	.36	.52	.84	1.04	1 14
	1.67	1.62	1.26	1.54	1.68			.04	1.04	1.15
	1.80		1.20	1.34	1.00	1.68	1.20	.24	. 24	.24
	.30	.24	. 12	. 12	- 12	. 12	. 10	.24	.12	.06
	. 12	.10	.06	14	.18	.06	.08	- 12	- 08	06

RUNOFF SUMMARY FLOW IN CUBIC FEET PER SECOND TIME IN HOURS, AREA IN SQUARE MILES

TIME OF MAX STAGE

• • .	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE 6-HOUR	FLOW FOR MAXIMU	M PERIOD 72-HOUR	BASIN AREA	MAX I
• .	HYDROGRAPH AT	MM1A	· 6.	5.00	1.	0.	0.	.90	
•	HYDROGRAPH AT	BW1	22.	7.10	11.	4.	4.	60.50	
•	HYDROGRAPH AT	BW2		6.00	2.	1.	1.	20.80	
•	2 COMBINED AT	BW1&2	22.	7.10	11.	4.	4.	81.30	
•	2 COMBINED AT	BW APX	9.	7.10	4.	2.	2.	82.20	•
•	HYDROGRAPH AT	MM1B	2.	5.30	0.	0.	0.	2.10	
. •	HYDROGRAPH AT	MM2	5.	5.15	1.	0.	0.	1.40	
• .	HYDROGRAPH AT	HP1A	16.	4.15	4.	2.	2.	.80	
•	ROUTED TO	RTCPA	15.	4.55	4.	2.	2.	.80	
•	HYDROGRAPH AT	HP18	3.	5.25	0.	0.	0.	1.00	
•	HYDROGRAPH AT	HP2	3.	5.25	1.	0.	0.	1.20	
•	4 COMBINED AT	CPA1	15.	5.40	4.	2.	2.	4.40	•
	HYDROGRAPH AT	HP3	14.	5.20	4.	2.	2.	1.70	,
•	2 COMBINED AT	CPA2	23.	5.30	6.	3.	3'.	6.10	
•	HYDROGRAPH AT	HP4	8.	5.25	2.		1.	3.30	
+	HYDROGRAPH AT	HP5	6.	5.00	1.	0.	0.	1.20	
•	HYDROGRAPH AT	HP6	10.	5.25	2.	1.	1.	2.20	
	ROUTED TO	RTCPD	10.	5.50	2.	1.	1.	2.20	
•	HYDROGRAPH AT	HPFA	1.	5.10	0.	0.	0.	.30	
•	3 COMBINED AT	CPD	10.	5.40	2.	1.	1.	3.70	
•	ROUTED TO	RTCPE	9.	•	2.	1.	1.	3.70	
•	HYDROGRAPH AT		2.	5.25	0.	0.	0.	1.60	•
•	3 COMBINED AT	СРЕ	9.	5.55	2.		1.	8.60	
•	S COMBINED AT	CPF	25.	5.50	6.	3.	3.	14.70	
•	HYDROGRAPH AT	sc1	15.		7.	3.	3.	39.40	:
•	HYDROGRAPH AT	sc2	2.	5.30	0.	0.	0.	1.50	
•						.			

4.2.2 Shallow Concentrated Flooding

Results of the HEC-2 analysis for the watercourses draining subbasins MM2 and HP1A&B estimated the 100-year flow depths at 2 feet. The southwest corner of the site is also located within the 100-year flood hazard of this drainage, and is designated as Zone AO; depth 2 feet (Figure 11 and Sheet 3). Again, this portion of the RWMS is not used for disposal of waste and is not included in the RCRA Part B Permit Application for the Area 5 RWMS. Appendix C contains the output of the HEC-2 model, the workmap, and cross sections used to analyze this drainage.

4.2.3 Sheetflow

FEMA (1991) usually describes areas that experience sheetflow as Zone X (an area of flooding with depths less than 1 foot). Calculations to determine the average 100-year depths for sheetflow areas support this assertion. Calculated depths within the proposed RWMS boundary and the proposed HWSU were all less than 1 foot. These facilities are not in a 100-year flood hazard from flow draining from the Massachusetts Mountains/Halfpint Range. Appendix D contains the calculations used to estimate the depth of flow in sheetflow regions.

Several measures were taken to assure that this flood assessment would be as conservative as reasonable. Discharges were calculated using a "state-of-the-art" approach for this region (i.e., CCRFCD Manual). All flow barriers such as roads, structures and existing nonengineered dikes were ignored to assume that all flow could reach the RWMS. The entire area was assumed to be prone to flooding and was delineated as an area of equal risk because of the inability to distinguish channels from the available topographic maps.

A Zone X designation is somewhat misleading. Although FEMA requires flood protection only for areas listed as Zone AO, a flood hazard must still be recognized within a Zone X. The sheetflow region to the north of the RWMS contains channels which range in depth up to 3 feet. FEMA (1991) states that discharge in sheetflow regions must be spread equally over the entire surface area. To the north of the RWMS, this results in average flow depths of less than 1 foot, and thus the designation of Zone X. Field observations of channels within this region indicate that flows greater than 1 foot could occur in these channels during a 100-year flood. Any type of flood protection design criteria must address the potential of channelized flow for this area.

5.0 REFERENCES

- Bull, W.B., 1964. History and Causes of Channel in Trenching Western Fresno County, California. American Journal of Science, Vol. 262. pp. 249–258.
- Case, C., et al., 1984. Site Characterization in Connection with the Low-Level Defense Waste Management Site in Area 5 of the Nevada Test Site, Nye County, Nevada Final Report. Desert Research Institute, University of Nevada System, Publication No. 45034; 130 pp.
- Chow, V. T., 1959. Open Channel Hydraulics. McGraw-Hill Book Company, New York.
- Clark County Regional Flood Control District, 1990. Hydrologic Criteria and Drainage Design Manual; Las Vegas, Nevada.
- Cox, N. D., 1986. Flood Risk Assessment for Low-Level Waste at the Nevada Test Site. EG&G Idaho, Inc., Idaho Falls, Idaho. 33 pages. (Internal Technical Report E&PM-A-86-031)

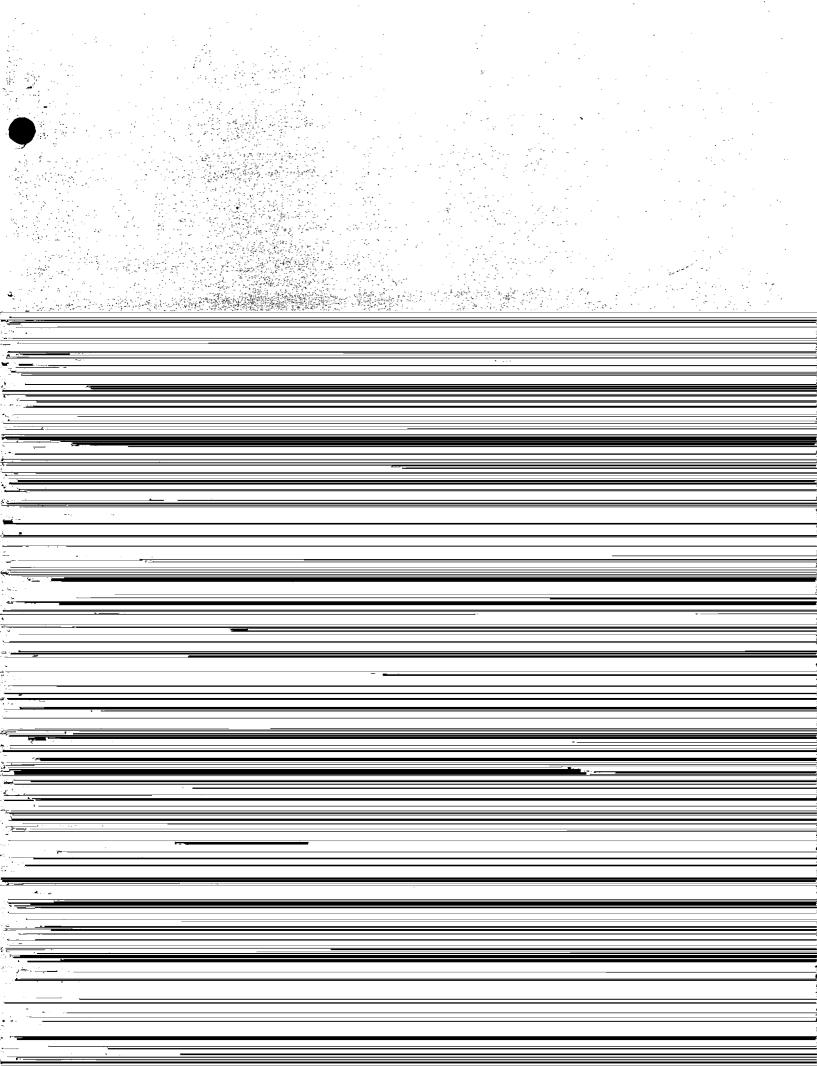
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APPENDIX B FEMA FAN MODEL OUTPUT

BARREN WASH ALLUVIAL FAN SCARP CANYON ALLUVIAL FAN

HALFPINT ALLUVIAL FAN

NOTE: Model Set 3 was used to delineate the flood hazard zones of these fans. See Section 3.4, Hydrology Discussion.



Barren Wash Alluvial Fan: Model Set 1

AVULSION FACTOR = 1.5000

FLOOD FREQUENCY CURVE DEFINED BY LEAST-SQUARES FIT OF DATA

RETURN INTERVAL (YEARS)	INPUT DISCHARGE (CFS)	BEST FIT DISCHARGE (CFS)
2	22	22
10	510	511
100	1848	1845

MEAN = 1.042752 STANDARD DEVIATION = 1.533850

SKEW = -1.2

SUMMARY OF DISCHARGES:

10-YEAR	DISCHARGE	=	511
50-YEAR	DISCHARGE	=	1440
100-YEAR	DISCHARGE	=	1845
500-YEAR	DISCHARGE	=	2633

STATISTICS AFTER TRANSFORMATION OF Y=LOG(Q) TO Z=1.6502+0.5415 LOG(Q)

MEAN OF Z = 2.214841

STANDARD DEVIATION = 0.830596

SKEW = -1.200000

TRANSFORMATION CONSTANT = 4.989660

			PROBABILITY OF DISCHARGE BEING EXCEEDED AT THE	· · · · · · · · · · · · · · · · · · ·
ENERGY (FT)	DEPTH (FT)	DISCHARGE (CFS)	APEX BY: 0.5415 Q 44.6869 Q	WIDTH (FT)
0.5 1.5	0.3 1.0	49 756	0.39939 0.77515 0.06472 0.22080	5458 1555

				TY OF DISCHARGE CEEDED AT THE	
VELOCITY	DEPTH	DISCHARGE		EX BY:	WIDTH
T/SEC)	(FT)	(CFS)		0.5415	(FT)
	• • •		Q	44.6869 Q	
3.5	0.4	68	0.35475	0.72986	5139
4.5	0.6	238	0.18938	0.50031	3523
5.5	0.9	649	0.07853	0.25818	1818
6.5	1.3	1496	0.01847	0.07781	548

SLOPE = 0.0120000 N-VALUE = 0.0300000

nunnav	DDDMA	DICOUNDOE	BEING EX	TY OF DISCHARGE CEEDED AT THE	MIDON
ENERGY	DEPTH	DISCHARGE	AP	EX BY:	WIDTH
(FT)	(FT)	(CFS)		0.5415	(FT)
			Q	44.6869 Q	
0.5	0.4	429	0.12044	0.35977	9627
		•			•

				CEEDED AT THE	
V CITY	DEPTH	DISCHARGE	AF	PEX BY:	WIDTH
(FT/SEC)	(FT)	(CFS)	Q	0.5415 44.6869 Q	(FT)
3.5	0.5	1046	0.03859	0.14838	3970

Barren Wash Alluvial Fan: Model Set 2

AVULSION FACTOR = 1.5000

FLOOD FREQUENCY CURVE DEFINED BY LEAST-SQUARES FIT OF DATA

RETURN INTERVAL (YEARS)	INPUT DISCHARGE (CFS)	BEST FIT DISCHARGE (CFS)
2	22	22
10	510	508
100	3513	3523

MEAN = 1.220155

STANDARD DEVIATION = 1.237478

SKEW = -0.6

SUMMARY OF DISCHARGES:

10-YEAR DISCHARGE = 508 50-YEAR DISCHARGE = 2234 100-YEAR DISCHARGE = 3523 500-YEAR DISCHARGE = 8018

STATISTICS AFTER TRANSFORMATION OF Y=LOG(Q) TO Z=1.3608+0.7454 LOG(Q)

MEAN OF Z = 2.270321

STANDARD DEVIATION = 0.922428

SKEW = -0.600000

TRANSFORMATION CONSTANT = 5.221557

ENERGY	DEPTH	DISCHARGE	BEING EX	TY OF DISCHARGE CEEDED AT THE PEX BY:	WIDTH
(FT)	(FT)	(CFS)	Q	0.7454 22.9512 Q	(FT)
0.5	0.3	49	0.38603	0.75342	55 52
1.5	1.0	756	0.07282	0.27335	2014
2.5	1.7	2712	0.01575	0.08826	650

				Y OF DISCHARGE EEDED AT THE	
COCITY	DEPTH	DISCHARGE		K BY:	WIDTH
(SEC)	(FT)	(CFS)	•	0.7454	(FT)
	, ,		Q 2	•	
3.5	0.4	68	0.33839	0.70932	52 27
4.5	0.6	238	0.17753	0.49364	36 37
5.5	0.9	649	0.08326	0.30011	2211
6.5	1.3	1496	0.03427	0.16404	1209
7.5	1.7	3059	0.01310	0.07724	56 6

SLOPE = 0.0120000 N-VALUE = 0.0300000

			· · · · · · · · · · · · · · · · · · ·	
ENERGY	DEPTH	DISCHARGE	PROBABILITY OF DISCHARGE BEING EXCEEDED AT THE APEX BY: 0.7454 Q 22.9512 Q	WIDTH
(FT)	(FT)	(CFS)		(FT)
0.5	0.4	429	0.11715 0.37930	10621
	,			
OCITY	DEPTH	DISCHARGE	PROBABILITY OF DISCHARGE BEING EXCEEDED AT THE APEX BY: 0.7454 Q 22.9512 Q	WIDTH
(FT/SEC)	(FT)	(CFS)		(FT)
3.5	0.5	1046	0.05069 0.21668	6067
4.5	0.8	2981	0.01367 0.07961	2218

Barren Wash Alluvial Fan: Model Set 3

AVULSION FACTOR = 1.5000

FLOOD FREQUENCY CURVE DEFINED BY LEAST-SQUARES FIT OF DATA

RETURN INTERVAL (YEARS)	INPUT DISCHARGE (CFS)	BEST FIT DISCHARGE (CFS)
2	22	22
10	510	511
100	6018	6011

MEAN = 1.323916 STANDARD DEVIATION = 1.089877 SKEW = -0.1

SUMMARY OF DISCHARGES:

10-YEAR DISCHARGE = 511 50-YEAR DISCHARGE = 3187 100-YEAR DISCHARGE = 6011 500-YEAR DISCHARGE = 21319

STATISTICS AFTER TRANSFORMATION OF Y=LOG(Q) TO Z=1.1038+0.9523 LOG(Q)

MEAN OF Z = 2.364550STANDARD DEVIATION = 1.037845 SKEW = -0.100000 TRANSFORMATION CONSTANT = 5.498632

			•	•	
·				TY OF DISCHARGE	
ENERGY	DEPTH	DISCHARGE	•	PEX BY:	WIDTH
(FT)	(FT)	(CFS)	•	0.9523	(FT)
		· · · · · · · · · · · · · · · · · · ·	Q	12.7010 Q	•
0.5	0.3	49	0.37636	0.74376	577 1
1.5	1.0	756	0.07741	0.31531	2447
2.5	1.7	2712	0.02368	0.15673	1203
			the state of the s		

PROBABILITY OF DISCHARGE

•		•	BEING EX	CEEDED AT THE	
ELOCITY	DEPTH	DISCHARGE	AF	EX BY:	WIDTH
FT/SEC)	(FT)	(CFS)		0.9523	(FT)
	•		Q	12.7010 Q	,
3.5	0.4	68	0.32668	0.70074	5438
4.5	0.6	238	0.17183	0.50209	3896
5.5	0.9	649	0.08625	0.33928	263 3
6.5	1.3	1496	0.04176	0.22110	1712
7.5	1.7	3059	0.02093	0.14484	1104
8.5	2.2	5719	0.01078	0.08963	639

SLOPE = 0.0120000 N-VALUE = 0.0300000

		•		Y OF DISCHARGE EEDED AT THE	,
ENERGY (FT)	DEPTH (FT)	DISCHARGE (CFS) ~	•	0.9523 12.7010 Q	WIDTH (FT)
0.5	0.4	429	0.11639	0.40412	11916

				EEDED AT THE	
OCITY	DEPTH	DISCHARGE	APE	X BY:	WIDTH
(FT/SEC)	(FT)	(CFS)		0.9523	(FT)
, , ,	, · ·		Q	12.7010 Q	
3.5	0.5	1046	0.05870	0.26939	7936
4.5	0.8	298 1	0.02152	0.14740	4278

AVULSION FACTOR = 1.5000

FLOOD FREQUENCY CURVE DEFINED BY LEAST-SQUARES FIT OF DATA

RETURN INTERVAL (YEARS)	INPUT DISCHARGE (CFS)	BEST FIT DISCHARGE (CFS)	
2	22	22	
10	1083	1100	
100	5498	5436	

MEAN = 0.967763

STANDARD DEVIATION = 1.909410

SKEW = -1.2

SUMMARY OF DISCHARGES:

10-YEAR DISCHARGE = 1100 50-YEAR DISCHARGE = 3994 100-YEAR DISCHARGE = 5436 500-YEAR DISCHARGE = 8466

STATISTICS AFTER TRANSFORMATION OF Y=LOG(Q) TO Z=2.1296+0.4869 LOG(Q)

MEAN OF Z = 2.600766

STANDARD DEVIATION = 0.929608

SKEW = -1.200000

TRANSFORMATION CONSTANT = 6.163823

,			PROBABILITY OF DISCHARGE	
ENERGY (FT)	DEPTH (FT)	DISCHARGE (CFS)	BEING EXCEEDED AT THE APEX BY: WIDTH 0.4869 (FT) Q 134.7735 Q	
0.5 1.5 2.5	0.3 1.0 1.7	49 / 756 2712	0.41930 0.84140 7319 0.13521 0.45395 3949 0.03806 0.17863 1554	•
LOCITY (Pr/SEC)		DISCHARGE (CFS)	PROBABILITY OF DISCHARGE BEING EXCEEDED AT THE APEX BY: WIDTH 0.4869 (FT)	

**.				EEDED AT THE	
LOCITY	DEPTH	DISCHARGE	APE	X BY:	WIDTH
T/SEC)	(FT)	(CFS)		0.4869	(FT)
			Q 1:	34.7735 Q	
3 .5 .	0.4	68	0.38395	0.81578	709 6
4.5	0.6	238	0.24947	0.66394	577 5
5.5	0.9	649	0.14958	0.48573	4225
6.5	1.3	1496	0.07778	0.3056 3	2659
7.5	1.7	3059	0.03212	0.15540	1352

5302

Barren Wash Alluvial Fan: Model Set 4

4.5

MULTIPLE-CHANNEL REGION

SLOPE = 0.0120000 N-VALUE = 0.0300000

ENERGY (FT)	DEPTH (FT)	DISCHARGE (CFS)	BEING E	ITY OF DISCHARGE XCEEDED AT THE PEX BY: 0.4869 134.7735 Q	WIDTH (FT)
0.5	0.4	429	0.18835	0.56624	18717
• •		i i	*. *		
VELOCITY (FT/SEC)	DEPTH (FT)	DISCHARGE (CFS)	•	ITY OF DISCHARGE XCEEDED AT THE PEX BY: 0.4869 134.7735 Q	WIDTH (FT)
3.5	0.5	1046	0.10475	0.38461	12713

2981

0.03340 0.16040

FEMA FAN MODEL OUTPUT

SCARP CANYON ALLUVIAL FAN

(Model Sets 1, 2, 3 & 4)

Scarp Canyon Alluvial Fan: Model Set 1

AVULSION FACTOR = 1.5000

FLOOD FREQUENCY CURVE DEFINED BY LEAST-SQUARES FIT OF DATA

RETURN INTERVAL (YEARS)	INPUT DISCHARGE (CFS)	BEST FIT DISCHARGE (CFS)
2	15	15
10	356	351
100	1251	1265
	•	•

MEAN = 0.878659STANDARD DEVIATION = 1.533991SKEW = -1.2

SUMMARY OF DISCHARGES:

10-YEAR DISCHARGE = 351 50-YEAR DISCHARGE = 987 100-YEAR DISCHARGE = 1265 500-YEAR DISCHARGE = 1805

STATISTICS AFTER TRANSFORMATION OF Y=LOG(Q) TO Z=1.5751+0.5415 LOG(Q)

MEAN OF Z = 2.050915STANDARD DEVIATION = 0.830638 SKEW = -1.200000 TRANSFORMATION CONSTANT = 4.290921

ENERGY	DEPTH	DISCHARGE	BEING EXC	Y OF DISCHARGE EEDED AT THE X BY:	WIDTH
(FT)	(FT)	(CFS)	Q	0.5415 37.5951 Q	(FT)
0.5	0.3	49	0.34883	0.72387	4383
1.5	1.0	756	0.03535	0.13698	829

VELOCITY T/SEC)				PROBABILITY OF DISCHARGE BEING EXCEEDED AT THE APEX BY: 0.5415 Q 37.5951 Q	
3.5	0.4	68	0.30420	0.67202	4069
4.5	0.6	238	0.14528	0.41207	2495
5.5	0.9	649	0.04559	0.17003	1030

SLOPE = 0.0148000 N-VALUE = 0.0300000

			PROBABILITY OF DISCHARGE	
ENERGY (FT)	DEPTH (FT)	DISCHARGE (CFS)	BEING EXCEEDED AT THE APEX BY: 0.5415 Q 37.5951 Q	WIDTH (FT)
0.5	0.4	443	0.07886 0.25909	5962

Q _{OCITY}	DEPTH	DISCHARGE	PROBABILITY OF DISCHARGED BEING EXCEEDED AT THE APEX BY:	· -	
(FT/SEC)	(FT)	(CFS)	0.541 Q 37.5951 Q		
3.5	o.4	805	0.03152 0.12353	2842	

Scarp Canyon Alluvial Fan: Model Set 2

AVULSION FACTOR = 1.5000

FLOOD FREQUENCY CURVE DEFINED BY LEAST-SQUARES FIT OF DATA

RETURN INTERVAL	INPUT DISCHARGE	BEST FIT DISCHARGE
(YEARS)	(CFS)	(CFS)
2	15	15
10	356	351
100	2178	2198

MEAN = 1.030262

STANDARD DEVIATION = 1.279943

SKEW = -0.7

SUMMARY OF DISCHARGES:

10-YEAR DISCHARGE = 351 50-YEAR DISCHARGE = 1443 100-YEAR DISCHARGE = 2198 500-YEAR DISCHARGE = 4604

STATISTICS AFTER TRANSFORMATION OF Y=LOG(Q) TO Z=1.3680+0.7081 LOG(Q)

MEAN OF Z = 2.097573

STANDARD DEVIATION = 0.906384

SKEW = -0.700000

TRANSFORMATION CONSTANT = 4.459600

•	5		•	•
ENERGY (FT)	DEPTH (FT)	DISCHARGE (CFS)	PROBABILITY OF DISCHARGE BEING EXCEEDED AT THE APEX BY: 0.7081 Q 23.3345 Q	WIDTH (FT)
	,			,
0.5	0.3	49	0.33492 0.70714	4450
1.5	1.0	756	0.04683 0.19857	1250
		· · · · · · · · · · · · · · · · · · ·		
			PROBABILITY OF DISCHARGE BEING EXCEEDED AT THE	•
VELOCITY	DEPTH	DISCHARGE	APEX BY:	WIDTH
T/SEC)	(FT)	(CFS)	0.7081	(FT)
			Q 23.3345 Q	
3.5	0.4	68	0.28883 0.65373	4114
4.5	0.6	238	0.14038 0.42021	2645

Scarp Canyon Alluvial Fan: Model Set 2

PAGE 3

MULTIPLE-CHANNEL REGION

SLOPE = 0.0148000N-VALUE = 0.0300000

ENERGY	DEPTH -	DISCHARGE	BEING EXC	COF DISCHARGE EEDED AT THE CBY:	WIDTH
(FT)	(FT)	(CFS)	Q 2	0.7081 23.3345 Q	(FT)
0.5	0.4	443	0.08348	0.29635	7087

PROBABILITY OF DISCHARGE BEING EXCEEDED AT THE

APEX BY:

DEPTH

DISCHARGE

WIDTH

23.3345 Q

3.5 0.4 805

0.04358 0.18942

4530

Scarp Canyon Alluvial Fan: Model Set 3

AVULSION FACTOR = 1.5000

FLOOD FREQUENCY CURVE DEFINED BY LEAST-SQUARES FIT OF DATA

RETURN INTERVAL (YEARS)	INPUT DISCHARGE (CFS)	BEST FIT DISCHARGE (CFS)
2	15	15
10	356	357
100	3498	3491

MEAN = 1.117872 STANDARD DEVIATION = 1.152607 SKEW = -0.3

SUMMARY OF DISCHARGES:

10-YEAR DISCHARGE = 357 50-YEAR DISCHARGE = 1976 100-YEAR DISCHARGE = 3491 500-YEAR DISCHARGE = 10458

STATISTICS AFTER TRANSFORMATION OF Y=LOG(Q) TO Z=1.2079+0.8628 LOG(Q)

MEAN OF Z = 2.172367 STANDARD DEVIATION = 0.994433 SKEW = -0.300000

TRANSFORMATION CONSTANT = 4.652288

		•	PROBABILITY OF DISCHARGE	
ENERGY	DEPTH	DISCHARGE	BEING EXCEEDED AT THE APEX BY:	WIDTH
7				
3 ————————————————————————————————————				
•				
7		•		
			Q 16.1400 Q	
, , , , , , , , , , , , , , , , , , ,		40	0.22521 0.70000	4600
0.5 1.5	0.3 1.0	49 756	0.32531 0.70098 0.05446 0.24845	4602 1631
2.5	1.7	27 12	0.01444 0.09633	625
		•		
•	•			
			1	.'
		•		. *
			PROBABILITY OF DISCHARGE	•
	,		BEING EXCEEDED AT THE	
LOCITY	DEPTH	DISCHARGE	APEX BY:	WIDTH
T/SEC)	(FT)	(CFS)	0.8628 Q 16.1400 Q	(FT)
			Q 10.1400 Q	,
3.5	0.4	68	0.27964 0.64926	4263
4.5	0.6	238	0.13909 0.43758	2873
5.5 6.5	0.9 1.3	649 1496	0.06377 0.27117 0.02760 0.16044	178 0 1051
7.5	1.7	3059	0.01232 0.08785	56 5
	· · · · · · · · · · · · · · · · · · ·			

SLOPE = 0.0148000 N-VALUE = 0.0300000

ENERGY	DEPTH	DISCHARGE	BEING EXC	Y OF DISCHARGE EEDED AT THE X BY:	WIDTH
(FT)	(FT)	(CFS)		0.8628 16.1400 Q	(FT)
0.5	0.4	443	0.08692	0.33143	8269

<u> </u>		•	1	TY OF DISCHARGE CEEDED AT THE	
OCITY	DEPTH	DISCHARGE	API	EX BY:	WIDTH
(FT/SEC)	(FT)	(CFS)		0.8628	(FT)
	, ,	. ,	Q	16.1400 Q	• •
3.5	0.4	805	0.05067	0.23920	5968
4.5	0.6	2293	0.01738	0.11285	2774

Scarp Canyon Alluvial Fan: Model Set 4

AVULSION FACTOR = 1.5000

FLOOD FREQUENCY CURVE DEFINED BY LEAST-SQUARES FIT OF DATA

RETURN INTERVAL (YEARS)	INPUT DISCHARGE (CFS)	BEST FIT DISCHARGE (CFS)	
2	15	15	
10	769	779	
100	3438	3406	
	M13. V	0.751400	
•	MEAN =	0.751408	
	STANDARD DEVIATION =	2.011177	

SUMMARY OF DISCHARGES:

10-YEAR DISCHARGE = 779 50-YEAR DISCHARGE = 2597 100-YEAR DISCHARGE = 3406

SKEW = -1.3

500-YEAR DISCHARGE = 4925

STATISTICS AFTER TRANSFORMATION OF Y=LOG(Q) TO Z=2.0997+0.4540 LOG(Q)

MEAN OF Z = 2.440823

STANDARD DEVIATION = 0.913058

SKEW = -1.300000

TRANSFORMATION CONSTANT = 5.305945

ENERGY (FT)	DEPTH (FT)	DISCHARGE (CFS)	PROBABILITY OF DISCHARGE BEING EXCEEDED AT THE APEX BY: 0.4540 Q 125.8027 Q	WIDTH (FT)
0.5	0.3	49	0.38263 0.81739	6120
1.5	1.0	756	0.10286 0.37538	2811
2.5	1.7	2712	0.01841 0.09197	689

PROBABILITY OF DISCHARGE

OCITY	DEPTH	DISCHARGE	BEING EXC	WIDTH	
T/SEC)	(FT)	(CFS)	711 137	0.4540	-
			Q 1:		
3.5	0.4	68	0.34751	0.78692	5892
4.5	0.6	238	0.21491	0.61188	4582
5.5	0.9	649	0.11751	0.41056	3074
6.5	1.3	1496	0.05029	0.21689	1624
7.5	1.7	3059	0.01396	0.07173	537

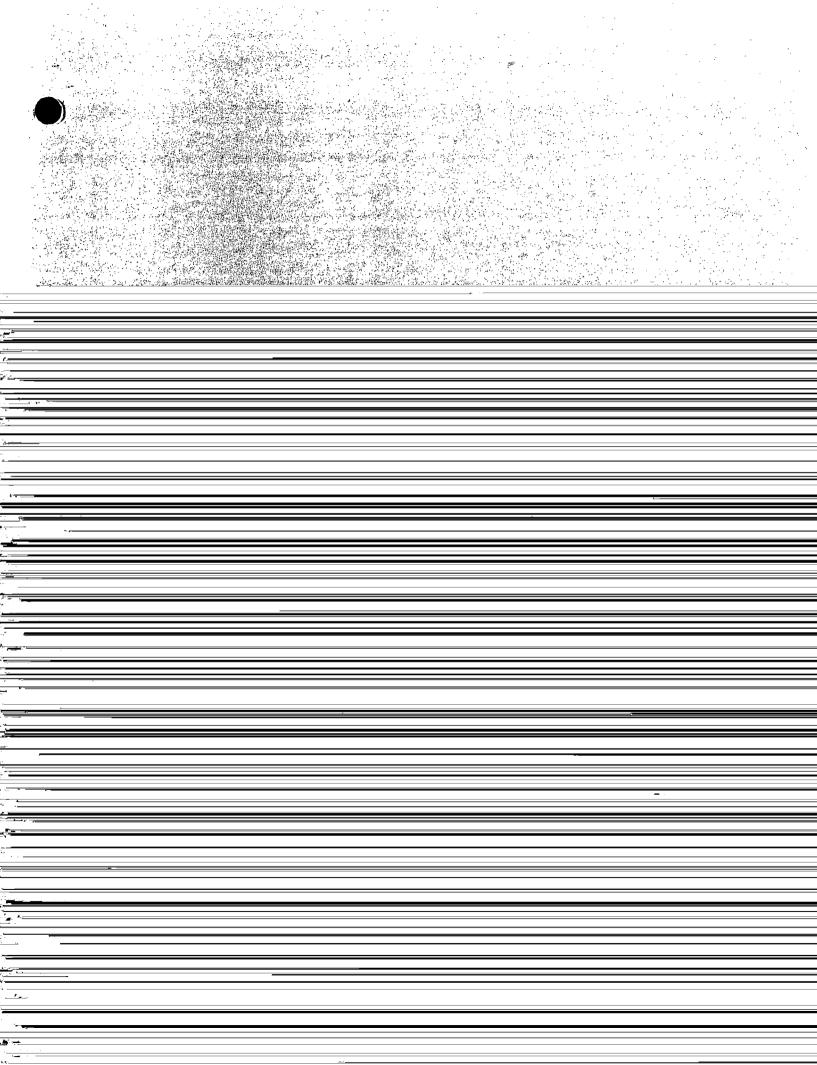
SLOPE = 0.0148000 N-VALUE = 0.0300000

ENERG Y	DEPTH	DISCHARGE	PROBABILITY OF DISCHARGE BEING EXCEEDED AT THE APEX BY:		WIDTH
(FT)	(FT)	(CFS)	Q 1	0.4540 25.8027 Q	(FT)
0.5	0.4	443	0.15397	0.49326	14035

PROBABILITY OF DISCHARGE

BEING EXCEEDED AT THE

(FT/SEC)	(FT)	(CFS)	Q 12	0.4540 25.8027 Q	(FT)	
3.5 4.5	0.4 0.6	805 2293	0.09752 0.02578	0.36091 0.12522	10269 3563	,



Halfpint Alluvial Fan: Model Set 1

AVULSION FACTOR = 1.5000

FLOOD FREQUENCY CURVE DEFINED BY LEAST-SQUARES FIT OF DATA

RETURN INTERVAL (YEARS)	INPUT	DISCHARGE (CFS)	and the second s	DISCHARGE CFS)
.2	•	10		10
10		168	;	170
100		603	**	598
	,			
· ·		MEAN =	0.759609	
	STANDARD	DEVIATION =	1.328618	

SUMMARY OF DISCHARGES:

10-YEAR	DISCHARGE	.=	170
50-YEAR	DISCHARGE	= '	464
100-YEAR	DISCHARGE	=	598
SOO-VEXD	DISCHARGE	_	876

STATISTICS AFTER TRANSFORMATION OF Y=LOG(Q) TO Z=1.2765+0.5980 LOG(Q)

MEAN OF Z = 1.730742

STANDARD DEVIATION = 0.794495

SKEW = -1.100000

TRANSFORMATION CONSTANT = 3.392134

(FT) (FT)	TH DISCHARGE T) (CFS)	0.5980	WIDTH (FT)
0.5 0.:	3 49	Q 18.9020 Q 0.26742 0.59475	2847

VELOCITY	DEPTH	DISCHARGE	BEING EX	WIDTH	
(FT/SEC)	(FT)	(CFS)	Q	0.5980 18.9020 Q	(FT)
3.5	0.4	68	0.21876	0.52204	2499
1 5	0.6	220	0 06833	0 21507	1022

SLOPE = 0.0196000 N-VALUE = 0.0300000

ENERGY (FT)	DEPTH (FT)	DISCHARGE (CFS)	BEING EX	TY OF DISCHARGE CEEDED AT THE EX BY: 0.5980 18.9020 Q	WIDTH (FT)
0.5	0.3	449	0.02168	0.08480	1543
				,	,

Q _{OCITY}	DEPTH	DISCHARGE	PROBABILITY OF DISCHARGE BEING EXCEEDED AT THE APEX BY:		WIDTH
(FT/SEC)	(FT)	(CFS)	Q	0.5980 18.9020 Q	(FT)
3.5	0.4	566	0.01212	0.04847	882

AVULSION FACTOR = 1.5000

FLOOD FREQUENCY CURVE DEFINED BY LEAST-SQUARES FIT OF DATA

RETURN INTERVAL (YEARS)	INPUT DISCHARGE (CFS)	BEST FIT DISCHARGE (CFS)
2	10	10
10	168	169
100	1180	1176

MEAN = 0.928731 STANDARD DEVIATION = 1.055311 SKEW = -0.4

SUMMARY OF DISCHARGES:

10-YEAR DISCHARGE = 169 50-YEAR DISCHARGE = 731 100-YEAR DISCHARGE = 1176 500-YEAR DISCHARGE = 2890

STATISTICS AFTER TRANSFORMATION OF Y=LOG(Q) TO Z=1.0090+0.8374 LOG(Q)

MEAN OF Z = 1.786716 STANDARD DEVIATION = 0.883714 SKEW = -0.400000 TRANSFORMATION CONSTANT = 3.569505

SINGLE-CHANNEL REGION

ENERGY (FT)	DEPTH (FT)	DISCHARGE (CFS)	BEING EX	TY OF DISCHARGE CEEDED AT THE PEX BY: 0.8374 10.2094 Q	WIDTH (FT)
0.5	0.3	49	0.24808	0.57142	2878
1.5	1.0	756	0.01928	0.09924	500

VELOCITY	DEPTH	DISCHARGE	BEING EX	TY OF DISCHARGE CEEDED AT THE EX BY:	WIDTH
T/SEC)	(FT)	(CFS)	Q	0.8374 10.2094 Q	(FT)
3.5	0.4	68	0.20017	0.50667	2552
4.5	0.6	238	0.07596	0.26560	1338
5.5	0.9	649	0.02353	0.11884	599

MULTIPLE-CHANNEL REGION

SLOPE = 0.0196000 N-VALUE = 0.0300000

			PROBABILITY OF DISCHARGE BEING EXCEEDED AT THE	
ENERGY (FT)	DEPTH (FT)	DISCHARGE (CFS)	APEX BY: 0.8374 Q 10.2094 Q	WIDTH (FT)
0.5	0.3	449	0.03741 0.16695	3196
	· ,			
LLOCITY (FT/SEC)	DEPTH (FT)	DISCHARGE (CFS)	PROBABILITY OF DISCHARGE BEING EXCEEDED AT THE APEX BY: 0.8374 Q 10.2094 Q	WIDTH (FT)
3.5	0.4	566	0.02835 0.13656	2614

AVULSION FACTOR = 1.5000

FLOOD FREQUENCY CURVE DEFINED BY LEAST-SQUARES FIT OF DATA

(YFARS)	(CFS)	(CFS)
2	10	10
. 10	168	168
100	1819	1821
	MEAN =	1.016033
	STANDARD DEVIATION =	0.935309
	SKEW =	0.1

SUMMARY OF DISCHARGES:

10-YEAR DISCHARGE = 168 50-YEAR DISCHARGE = 970 100-YEAR DISCHARGE = 1821 500-YEAR DISCHARGE = 6634

STATISTICS AFTER TRANSFORMATION OF Y=LOG(Q) TO Z=0.7953+1.0450 LOG(Q)

MEAN OF Z = 1.857036

STANDARD DEVIATION = 0.977359

SKEW = 0.100000

TRANSFORMATION CONSTANT = 3.728261

SINGLE-CHANNEL REGION

PROBABILITY OF DISCHARGE

	BEING EXCEEDED AT THE					
ENERGY	<u>ре</u> ртн	DISCHARGE	AP	EX BY:	WIDTH	
(FT)	(FT)	(CFS)	Q	1.0450 6.2420 Q	(FT)	
0.5 1.5	0.3	49 756	0.23709 0.02605	0.56316 0.15414	2963 802	
VELOCITY	рертн	DISCHARGE	BEING EX	TY OF DISCHARGE CEEDED AT THE EX BY:	WIDTH	

				EEDED AT THE	
VELOCITY	DEPTH	DISCHARGE	APE	EX BY:	WIDTH
T/SEC)	(FT)	(CFS)		1.0450	(FT)
			Q	6.2420 Q	-,
3.5	0.4	68	0.19242	0.50416	265 3
4.5	0.6	238	0.07866	0.29407	1546
5.5	0.9	649	0.03085	0.1690 9	883
6.5	1.3	1496	0.01313	0.09258	462

MULTIPLE-CHANNEL REGION

SLOPE = 0.0196000 N-VALUE = 0.0300000

ENERGY	DEPTH	DISCHARGE	BEING EX	TY OF DISCHARGE CEEDED AT THE EX BY:	WIDTH
(FT)	(FT)	(CFS)	Q	1.0450 6.2420 Q	(FT)
0.5	0.3	449	0.04315	0.20703	4126

COCITY	DEPTH	DISCHARGE	PROBABILITY OF DISCHARGE BEING EXCEEDED AT THE APEX BY:		WIDTH
(FT/SEC)	(FT)	(CFS)	Q 6.2	1.0450 420 Q	(FT)
3.5	0.4	566	0.03509 0	.18232	3625
4.5	0.5	1614	0.01192 0	.08813	1651

AVULSION FACTOR = 1.5000

FLOOD FREQUENCY CURVE DEFINED BY LEAST-SQUARES FIT OF DATA

RETURN INTERVAL (YEARS)	INPUT DISCHARGE (CFS)	BEST FIT DISCHARGE (CFS)
2	10	10
10	335	343
100	1898	1867
· .		

MEAN = 0.734788 STANDARD DEVIATION = 1.596884 SKEW = -1.0

SUMMARY OF DISCHARGES:

10-YEAR DISCHARGE = 343 50-YEAR DISCHARGE = 1310 100-YEAR DISCHARGE = 1867 500-YEAR DISCHARGE = 3269

STATISTICS AFTER TRANSFORMATION OF Y=LOG(Q) TO Z=1.6637+0.5765 LOG(Q)

MEAN OF Z = 2.087308

STANDARD DEVIATION = 0.920624

SKEW = -1.000000

TRANSFORMATION CONSTANT = 4.101043

SINGLE-CHANNEL REGION

ENERGY	DEPTH	DISCHARGE	PROBABILITY OF DISCHARGE BEING EXCEEDED AT THE APEX BY:		WIDTH
(FT)	(FT)	(CFS)	Q	0.5765 46.0992 Q	(FT)
0.5	0.3	49	0.31010	0.71462	4136
1.5	1.0	756	0.04476	0.19714	1141

VELOCITY	DEPTH	DISCHARGE	BEING EX	TY OF DISCHARGE CEEDED AT THE EX BY:	WIDTH
/SEC)	(FT)	(CFS)		0.5765	(FT)
			Q	46.0992 Q	
3.5	0.4	68	0.27085	0.66516	3850
4.5	0.6	238	0.13611	0.43540	2520
5 .5	0.9	649	0.05423	0.22757	1317
6.5	1.3	1496	0.01626	0.08582	497

(FT/SEC)

(FT)

(CFS)

PAGE 3

(FT)

0.5765

Q 46.0992 Q

MULTIPLE-CHANNEL REGION

SLOPE = 0.0196000 N-VALUE = 0.0300000

	· · · · · · · · · · · · · · · · · · ·		PROBABILITY OF DISCHARGE BEING EXCEEDED AT THE	
ENERGY (FT)	DEPTH (FT)	DISCHARGE (CFS)	APEX BY: 0.5765 Q 46.0992 Q	WIDTH (FT)
0.5	0.3	449	0.08068 0.30203	6642

PROBABILITY OF DISCHARGE

APPENDIX C HEC-2 MODEL OUTPUT

INCLUDES:
HEC-2 MODEL OUTPUT
WORKMAP
CROSS SECTIONS

HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991

29JAN93 TIME 15:20:50 RUN DATE

U.S. ARMY CORPS OF ENGINEERS
HYDROLOGIC ENGINEERING CENTER
609 SECOND STREET, SUITE D
DAVIS, CALIFORNIA 95616-4687
(916) 756-1104

Χ.	×	XXXXXXX	· XX)	(XX		XXX	XX ·
Х	Х	X	X.	Х	•	X	Х
Х	Х	X	Х	* **			X
XXXX	(XXX)	XXXX	Х	•	XXXXX	XXX	XX
Χ .	Х	X	X			X	
Х	X	X	X	. X		X	
X	Х	XXXXXXX	XX)	(XX	•	XXXX	XXX

11 HEC-2 RUN TO DETERMINE 100-YEAR FLOOD HAZARD LIMITS AND DEPTHS
12 SOUTHWEST CORNER OF RWMS ASSUMING NO BERM
13 FLOW CONDITION OF "NATURAL CONDITIONS" FILE: SWCRWMS.DAT SUBCRITICAL FLOW

CROSS SECTIONS DEVELOPED FROM 1"=400', 5' C.I. TOPOGRAPHIC MAP OF THE RWMS.
THE 100-YEAR DISCHARGE AT CROSS SECTION 1 FROM HEC-1 MODEL RWMSW.OUT (CPF)
IS 2396 CFS. THE REMAINING CROSS SECTIONS (2-7) USED THE 100-YEAR DISCHARGE
OF 1230 CFS FROM HEC-1 MODEL RWMSW.OUT (CPA1).

J1 I	CHECK	INO	NINV	IDÍR	STRT	METRIC	HVINS	Q	WSEL	FQ	
	Ó	2	0	0	-1	. 0	0	0	3166	0	
J2 NF	PROF	IPLOT .	PRFVS .	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE	
	1	0	-1	0	. 0	-1	0	0	0	0	
NC	0.040	0.040	. 035		.1	.3	0	0	. 0		
QT X1 GR GR	1.0 3175 3175	2396 6 0 670	0 3165		670 300	0 3167	0 340	0 3165	360	3170	390
QT X1 GR GR GR	1 2.0 3180 3176 3176 3176	1229 19 0 461 555 611	445 3177.5 3176 3175 3176		661 420 470 556 660	1240 3177.5 3175.5 3175 3178	1240 445 471 590 661	1240 3177 3175.5 3176.5 3180	446 490 591 930	3176.5 3176 3176.5	460 491 610
X1 GR GR	3.0 3185 3181	9 0 776	765 3181 3181		821 740 820	560 3181 3182	560 765 821	560 3180 3185	766 1100	3180	775
X1 GR	4.0 3190	3 0	0 3185		1060 660	800 3190	800 1060	800			,
X1 GR	5.0 3215	3 0	~ 0 3210		1440 770	1840 3215	1840 1440	1840			
X1 GR	6.0 3220	3 0	0 3215		1130 440	820 3220	820 1130	820	·		
X1 GR	7 3230	3 0	0 3225		1150 590	780 3230	780 1,150	780			

SECNO	DEPTH QLOB	CWSEL	CRIWS	WSELK ALOB	EG ACH	HV AROB	HL . VOL	OLOSS TWA	L-BANK ELEV R-BANK ELEV
TIME SLOPE	X L OB L	XLCH	VROB XLOBR	XNL ITRIAL	XNCH IDC	XNR I CONT	WTN CORAR	ELMIN TOPWID	SSTA ENDST
*PROF 1								٠.	
CCHV= .10 *SECNO 1.000 3720 CRITICAL	OO CEHV=						· .		· :
1.000 2396.0 .00		3168.18 2396.0 7.66	3168.18 .0	3166.00 .0 .000	3169.09 312.8 .035	.91 .0 .000	.00	.00 .0 3165.00	3175.00 3175.00 204.61
.015002	0.	0.	0.	Ô	22	Ö	.00	174.47	379.08
*SECNO 2.000				•				*	
3301 HV CHAN	GED MORE 1				• • •			· .	
2.000 1229.0 .11 .002669	2.68 3.6 .52 1240.	3177.68 1225.4 3.19 1240.	.0 .00	.00 7.0 .040 6	3177.84 383.9 .035 0	.16 .0 .000 0	8.67 10.0 .000 .00	.08 6.3 3175.00 270.29	3177.50 3178.00 390.55 660.84
*SECNO 3.000 3685 20 TRIA 3693 PROBABL 3720 CRITICA 3.000 1229.0 .14	LS ATTEMPT E MINIMUM	SPECIFIC !	NERGY	.00 187.7 .040 20	3182.70 82.1 .035 12	.40 4.1 .040 0	2.92 14.3 .000	.07 10.3 3180.00 348.26	3181.00 3182.00 500.26 848.52
*SECNO 4.000	•			A .			. *		
3302 WARNING		NCE CHANG	- OUTSIDE	NE ACCEPTAI	RIF PANCE	KRATIO =	, 2 10		
4.000 1229.0 .23 .003005	2.17	3187.17 1229.0 2.46 800.	•			.09		.03 17.7 3185.00 460.39	3190.00 3190.00 373.34 833.73
*SECNO 5.000 3685 20 TRIA 3693 PROBABL 3720 CRITICA 5.000 1229.0 .34 .021001	LS ATTEMP E MINIMUM L DEPTH AS 1.34	SPECIFIC (SSUMED	J SEL	.00 .0 .000 20		.35 .0 .000 0	11.64 37.4 .000	.08 35.6 3210.00 387.21	3215.00 3215.00 562.95 950.16
*SECNO 6.000									
3302 WARNING	: CONVEY	ANCE, CHANG	E OUTSIDE	OF ACCEPTA	BLE RANGE,	KRATIO =	2.55		•
6.000 1229.0 .43 .003231	2.09 .0 .00 820	3217.09 1229.0 2.49 820.	.00 .00 .820.	.00 .00 .000 .8	3217.18 494.3 .035 0	.10 .00 .000	5.47 44.6 .000 .00	.03 43.7 3215.00 472.69	3220.00 3220.00 255.94 728.63
*SECNO 7.000 3685 20 TRIA 3693 PROBABL 3720 CRITICA 7.000 1229.0 .47 .020478	LS ATTEMP' E MINIMUM	SPECIFIC		.00 .0 .000 20	3226.85 248.4 .035	.38 .0 .000	5.16 51.2 .000	.09 51.0 3225.00 338.04	3230.00 3230.00 416.57 754.61
.020470	100.	100.	700.	۽ د	17	U	.00	JJ0.04	104.01

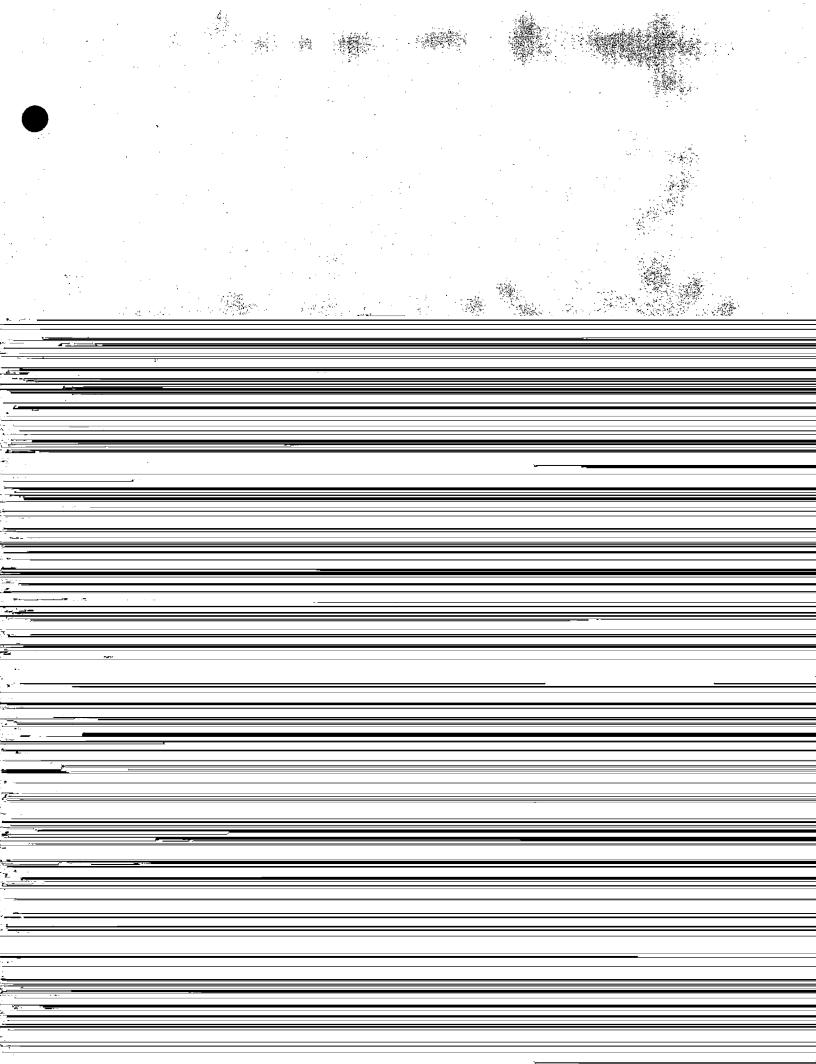
NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

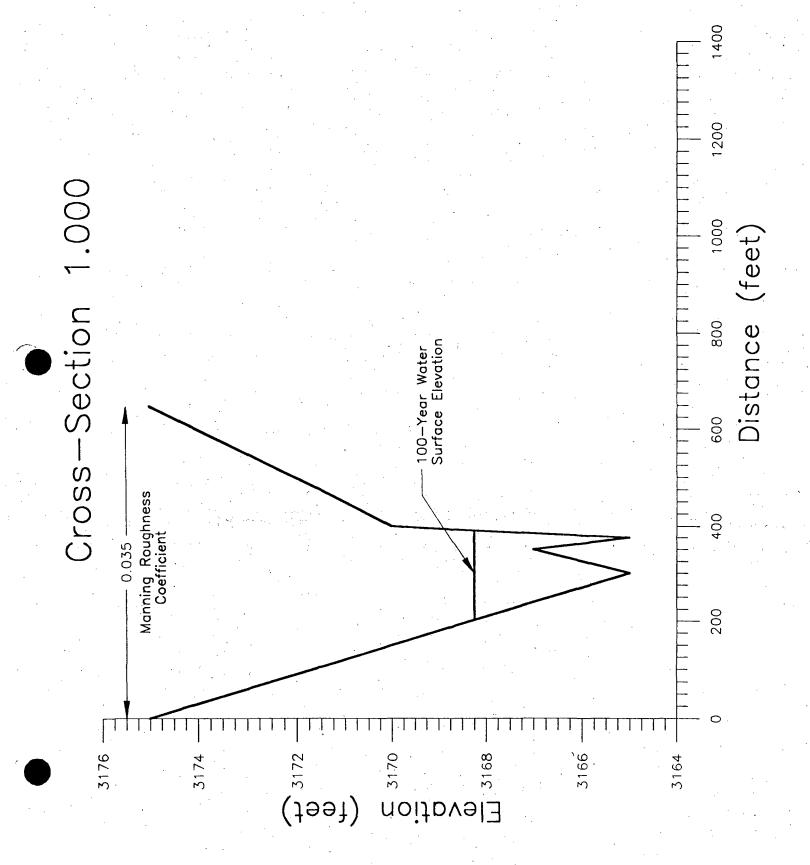
CONDITION OF "NATURAL C SUMMARY PRINTOUT TABLE 150

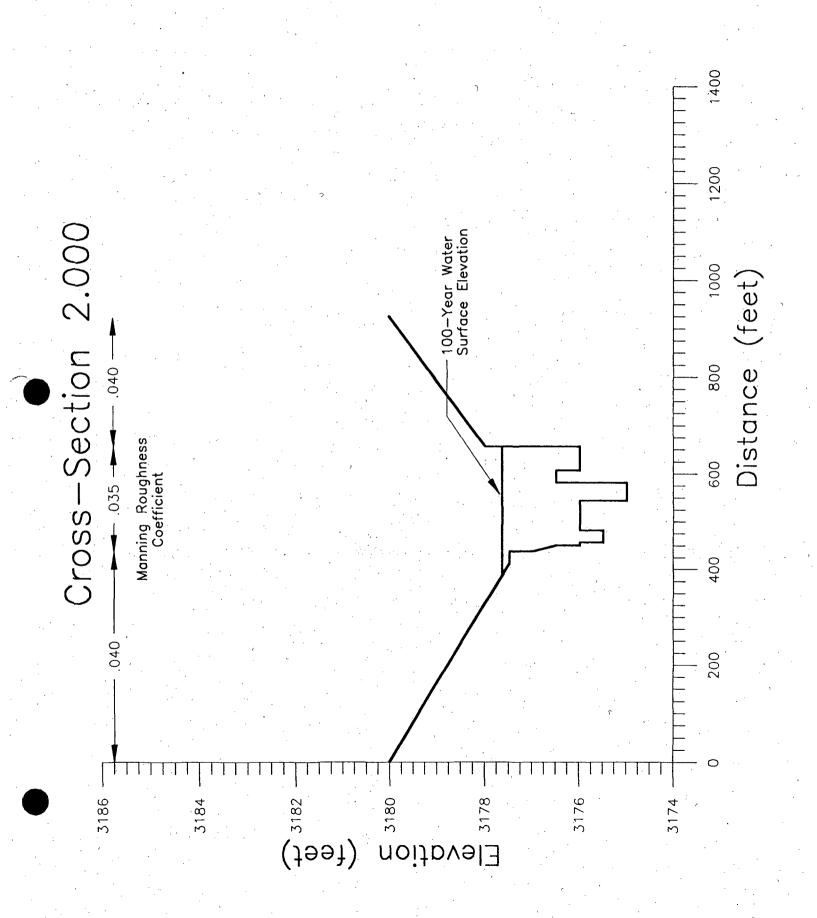
	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
*	1.000	.00	.00	.00	3165.00	2396.00	3168.18	3168.18	3169.09	150.02	7.66	312.77	195.62
	2.000	1240.00	.00	.00	3175.00	1229.00	3177.68	.00	3177.84	26.69	3.19	390.85	237.88
*	3.000	560.00	.00	.00	3180.00	1229.00	3182.30	3182.30	3182.70	144.48	6.49	273.88	102.25
*	4.000	800.00	.00	.00	3185.00	1229.00	3187.17	.00	3187.26	30.05	2.46	499.89	224.21
*	5.000	1840.00	.00	.00	3210.00	1229.00	3211.34	3211.34	3211.69	210.01	4.72	260.30	84.81
*	6.000	820.00	.00	.00	3215.00	1229.00	3217.09	.00	3217.18	32.31	2.49	494.33	216.23
*	7.000	780.00	.00	.00	3225.00	1229.00	3226.47	3226.47	3226.85	204.78	4.95	248.41	85.88
tr	1.000	2396.00	3168.18	.00	.00	2.18	174.47	.00		•			
	2.000	1229.00	3177.68	.00	9.50	.00	270.29	1240.00				* 1	• .
*	3.000	1229.00	3182.30	.00	4.62	.00	348.26	560.00					
* .	4.000	1229.00	3187.17	.00	4.87	.00	460.39	800.00					•
*	5.000	1229.00	3211.34	00,	24.17	.00	387.21	1840.00					•
٠.	6.000	1229.00	3217.09	.00	5.74	.00	472.69	820.00				/	
*	7.000	1229.00	3226.47	.00	9.38	.00	338.04	780.00			• ,		

SUMMARY OF ERRORS AND SPECIAL NOTES

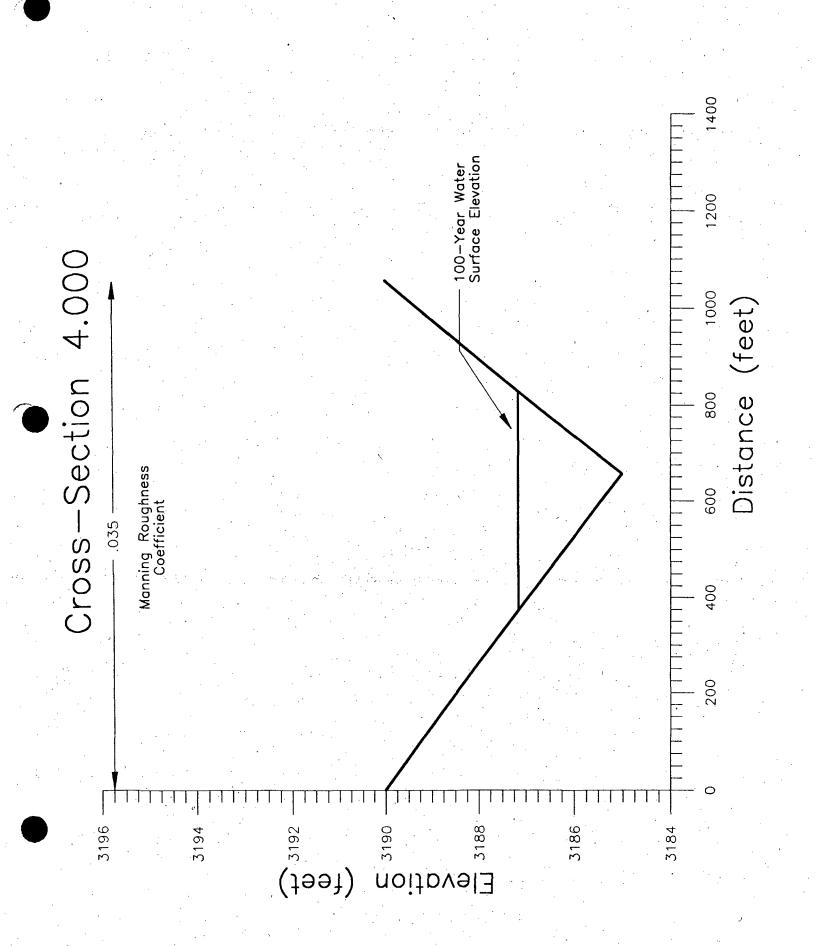
CAUTION	SECNO=	1.000	PROFILE= . 1	i	CRITICAL DEPTH ASSUMED
	SECNO=	3.000	PROFILE= 1	١	CRITICAL DEPTH ASSUMED PROBABLE MINIMUM SPECIFIC ENERGY 20 TRIALS ATTEMPTED TO BALANCE WSEL
WARNING	SECNO=	4.000	PROFILE=	1	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
CAUTION CAUTION CAUTION		5.000	PROFILE= 1	1	CRITICAL DEPTH ASSUMED PROBABLE MINIMUM SPECIFIC ENERGY 20 TRIALS ATTEMPTED TO BALANCE WSEL
WARNING.	SECNO=	6,000	PROFILE=	1	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
	SECNO≈	7.000	PROFILE=	1	CRITICAL DEPTH ASSUMED PROBABLE MINIMUM SPECIFIC ENERGY 20 TRIALS ATTEMPTED TO BALANCE WSEL

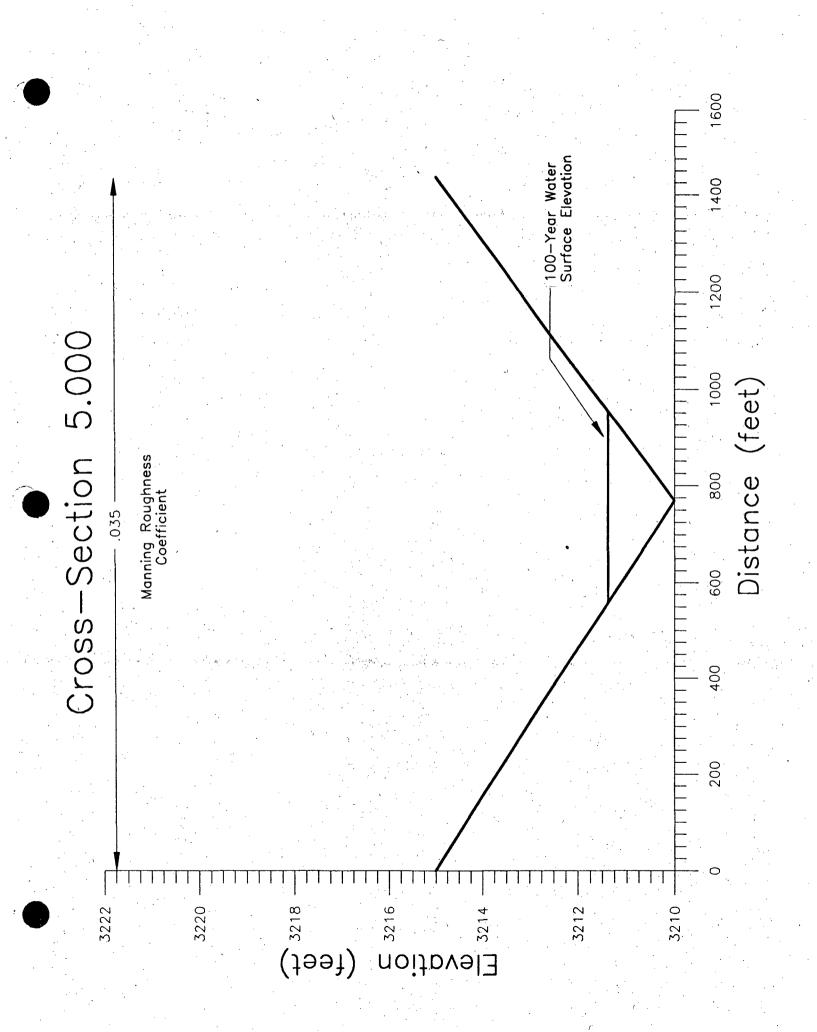


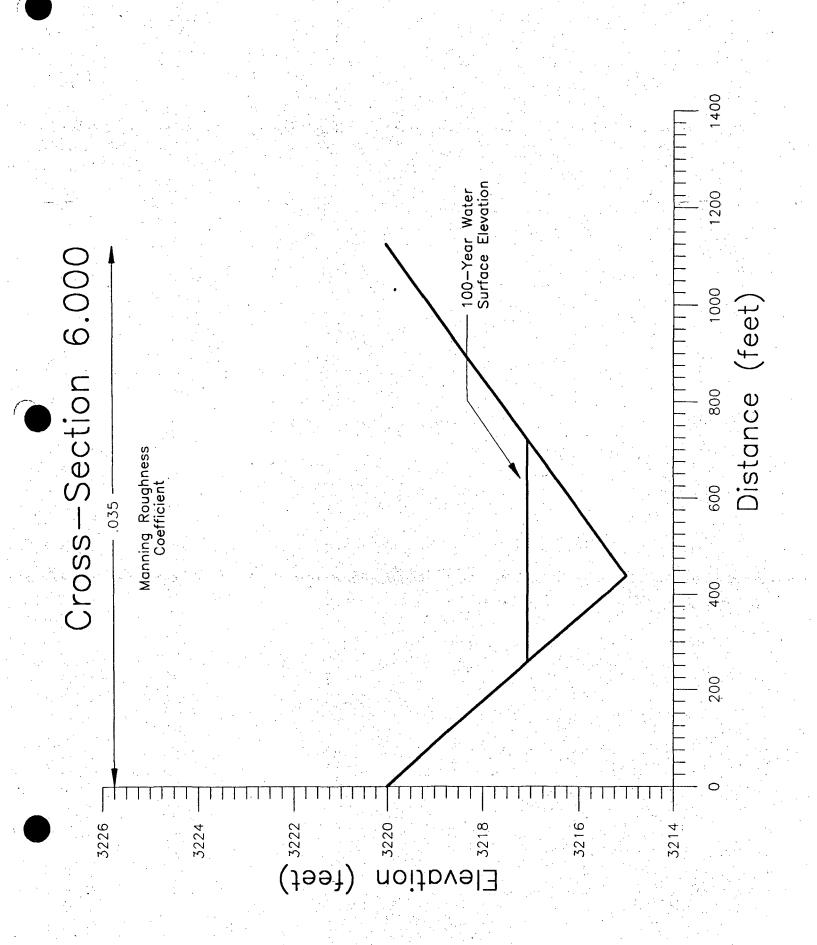


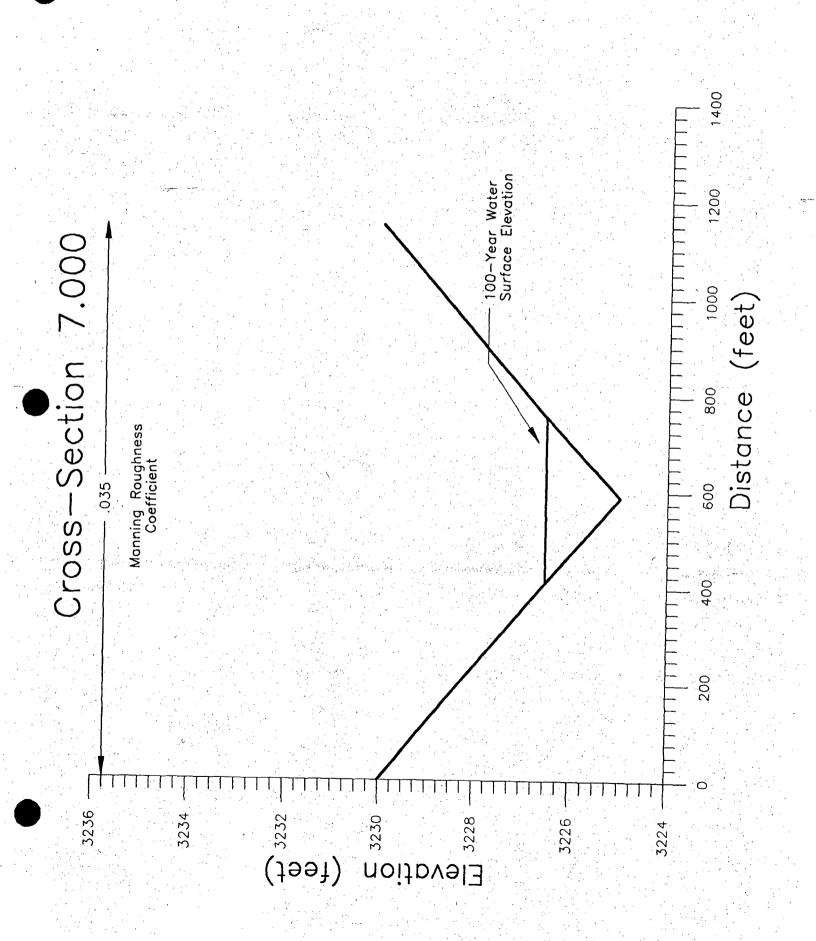


00—Year Water urface Elevation









APPENDI

APPENDIX D SHEETFLOW CALCULATIONS

SHEETFLOW CALCULATIONS ALONG THE NORTH, EAST AND WEST BOUNDARIES OF THE AREA 5 RWMS.

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SHEETFLOW CALCULATIONS FOR THE NORTH SIDE OF THE AREA 5 RWMS

CHANGE IN ELEVATION	REACH LENGTH	MANNING COEFFICIENT	SLOPE	WIDTH	DISCHARGE
(ft)	(ft)		(ft/ft)	(ft)	(ft³/sec)
90	3500	0.035	0.026	2500	624

Q=DISCHARGE (ft³/sec)

V=VELOCITY (ft/sec)

A = AREA (ft^2) (For a rectangular channel, area = depth * width)

R=HYDRAULIC RADIUS (ft) (For a shallow channel, assume R=depth)

S=SLOPE (ft/ft)

n=MANNING COEFFICIENT

W = WIDTH (ft)

d = DEPTH (ft)

EQUATIONS:

Q=VA

 $V = \frac{1.49}{n} R^{2/3} S^{1/2}$

n_ 1.49 p23 c1R4

n

CALCULATIONS:

$$Q = \frac{1.49}{n} d^{2/3} S^{1/2} dW$$

$$Q = \frac{1.49}{n} d^{5/3} S^{1/2} W$$

$$d = \frac{Qn}{(1.49S^{1/2}W)^{3/5}}$$

DEPTH CALCULATION:

FLOW DEPTH $= 0.11 \, ft$

SHEETFLOW CALCULATIONS FOR THE EAST SIDE OF THE AREA 5 RWMS

CHANGE IN	REACH MANNING	SLOPE WIDTH	DISCHARGE
ELEVATION (ft)	LENGTH COEFFICIENT (ft)	(ft/ft) (ft)	(ft³/sec)
75	4250 0.035	0.018 2460	1100

Q=DISCHARGE (ft³/sec)

V=VELOCITY (ft/sec)

A = AREA (ft^2) (For a rectangular channel, area = depth * width)

R=HYDRAULIC RADIUS (ft) (For a shallow channel, assume R=depth)

S = SLOPE (ft/ft)

n=MANNING COEFFICIENT

W = WIDTH (ft)

d = DEPTH (ft)

EQUATIONS:

$$V = \frac{1.49}{n} R^{2/3} S^{1/2}$$

$$Q = \frac{1.49}{n} R^{2/3} S^{1/2} A$$

CALCULATIONS:

$$Q = \frac{1.49}{n} d^{2/3} S^{1/2} dW$$

$$Q = \frac{1.49}{n} d^{5/3} S^{1/2} W$$

$$d = \frac{Qn}{(1.49S^{1/2}W)^{3/5}}$$

DEPTH CALCULATION:

FLOW DEPTH = $0.22 \, ft$

SHEETFLOW CALCULATIONS FOR THE WEST SIDE OF THE AREA 5 RWMS

CHANGE IN	REACH	MANNING	SLOPE	WIDTH	DISCHARGE
ELEVATION (ft)	LENGTH (ft)	COEFFICIENT	(ft/ft)	(ft)	(ft³/sec)
100	3500	0.035	0.029	2780	450

Q=DISCHARGE (ft³/sec)

V = VELOCITY (ft/sec)

A=AREA (ft²) (For a rectangular channel, area = depth * width)

R=HYDRAULIC RADIUS (ft) (For a shallow channel, assume R=depth)

S=SLOPE (ft/ft)

n=MANNING COEFFICIENT

W = WIDTH (ft)

d = DEPTH (ft)

EQUATIONS:

Q=VA

 $Q = \frac{1.49}{n} R^{2/3} S^{1/2} A$

CALCULATIONS:

$$Q = \frac{1.49}{n} d^{2/3} S^{1/2} dW$$

$$Q = \frac{1.49}{7} d^{5/3} S^{1/2} W$$

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